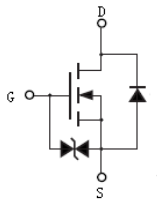
N-Channel Enhancement Mode MOSFET

2N7002HE

Features

- Low on-resistance
- ESD protected gate up to 2kV HBM
- High-speed switching
- Drive circuits can be simple
- Parallel use is easy

HF

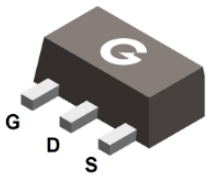


Typical Applications

- N-channel enhancement mode effect transistor
- Switching application

Mechanical Data

- Case: SOT-89
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin-Plated Leads, Solderability-per MIL-STD-202, Method 208



SOT-89

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
2N7002HE	SOT-89	1000 pcs / Tape & Reel	7002K

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate -Source Voltage	V_{GSS}	±20	V
Continuous Drain Current	I_D	400	mA
Pulsed Drain Current	I_{DM}	800	mA

Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation (T_A = 25°C)	P_D	0.5	W
Thermal Resistance Junction-to-Air	$R_{\theta JA}$	250	°C/W
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Electrical Characteristics (@ T_A = 25°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}	Drain to Source Leakage Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-body Leakage	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *1	V_{GS} = 5V, I_D = 0.05A	-	1.5	3	Ω
		V_{GS} = 10V, I_D = 0.5A	-	1.45	2.5	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1	1.5	2.5	V
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 20V f = 1.0MHz	-	47.2	-	pF
C_{OSS}	Output Capacitance		-	7.3	-	
C_{RSS}	Reverse Transfer Capacitance		-	4.7	-	
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time *2	V_{DD} = 30V, I_D = 0.2A V_{GS} = 10V, R_G = 25Ω R_L = 150Ω	-	6	-	ns
t_r	Turn-on Rise Time *2		-	5	-	
$t_{d(off)}$	Turn-Off Delay Time *2		-	25	-	
t_f	Turn-Off Fall Time *2		-	15	-	
Q_G	Total Gate-Charge	V_{DS} = 10V V_{GS} = 4.5V I_D = 0.2A	-	0.44	-	nC
Q_{GS}	Gate to Source Charge		-	0.14	-	nC
Q_{GD}	Gate to Drain (Miller) Charge		-	0.2	-	nC
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *1	I_S = 0.3A, V_{GS} = 0V	-	0.85	1.2	V
I_S	Diode Continuous Forward Current	T_C = 25°C	-	-	0.3	A

Notes:

1. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
2. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

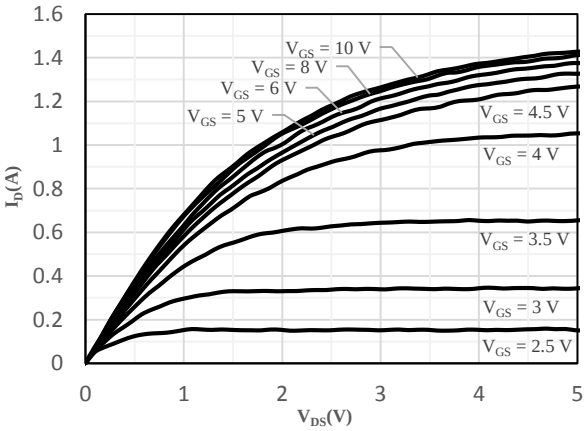


Fig 1 Typical Output Characteristics

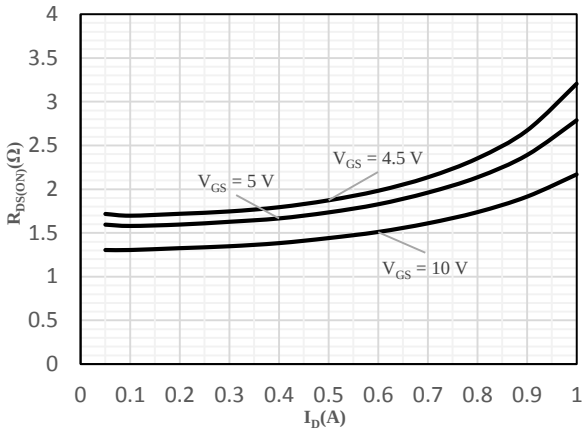


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

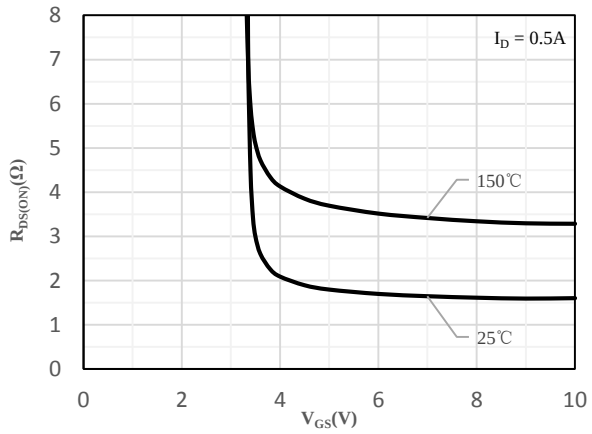


Fig 3 On-Resistance vs. Gate-Source Voltage

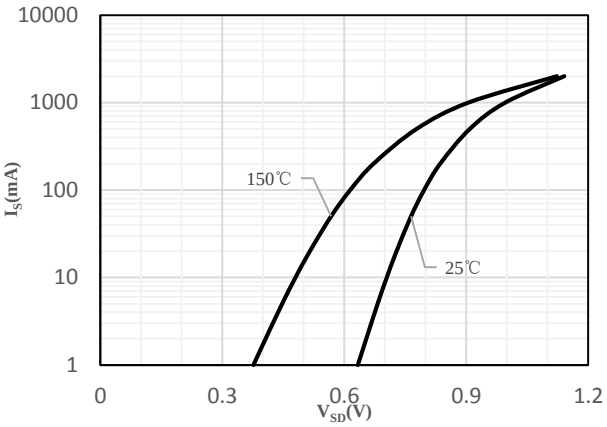


Fig 4 Body-Diode Characteristics

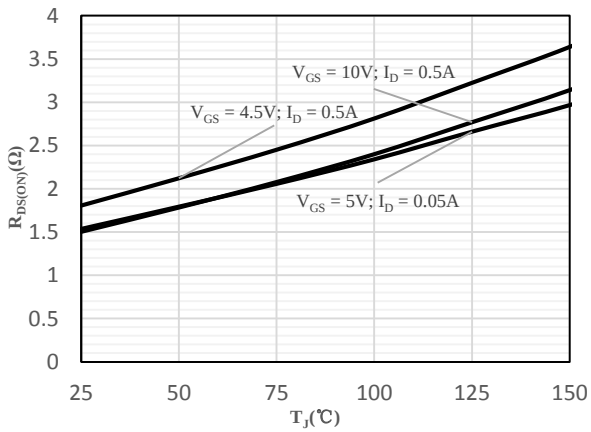


Fig 5 On-Resistance vs. Junction Temperature

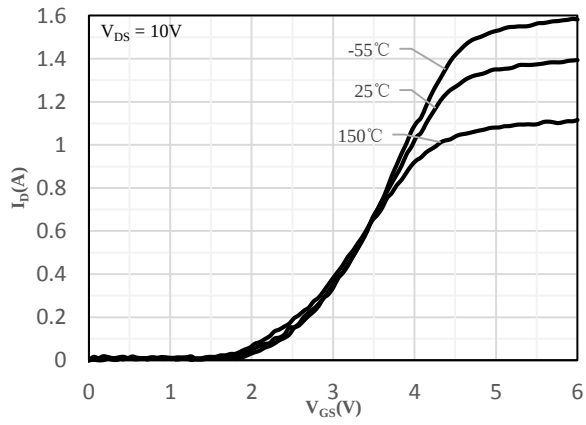


Fig 6 Transfer Characteristics

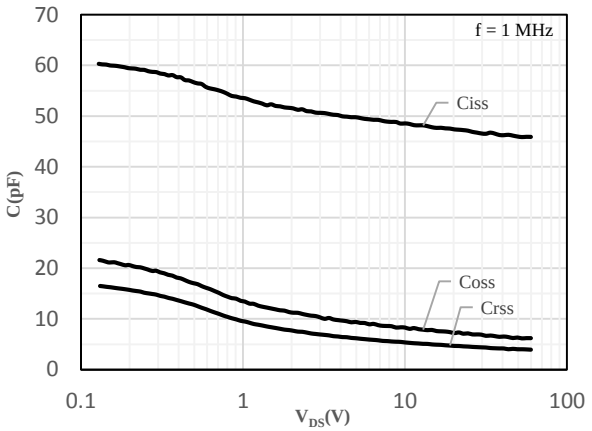


Fig 7 Capacitance Characteristics

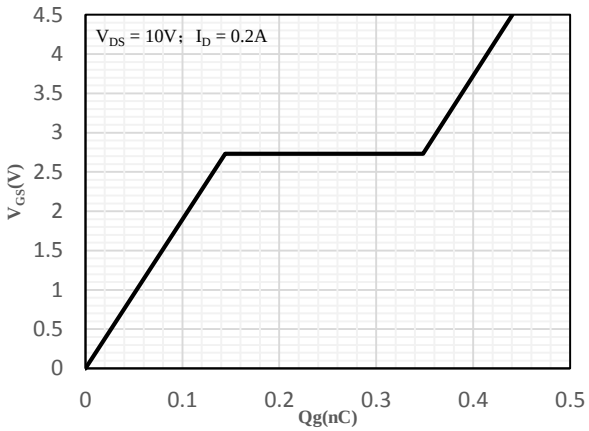


Fig 8 Gate-Charge Characteristics

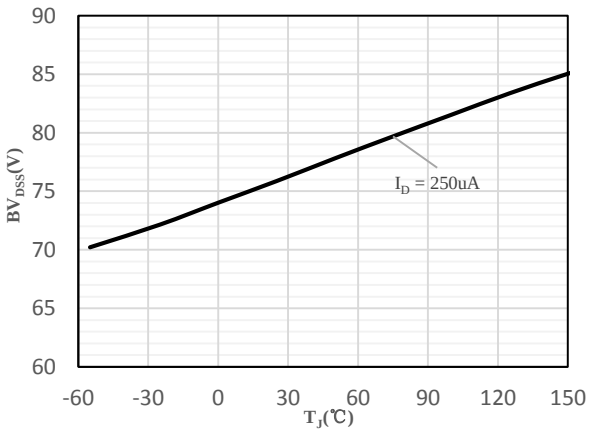


Fig 9 Breakdown Voltage vs. Junction Temperature

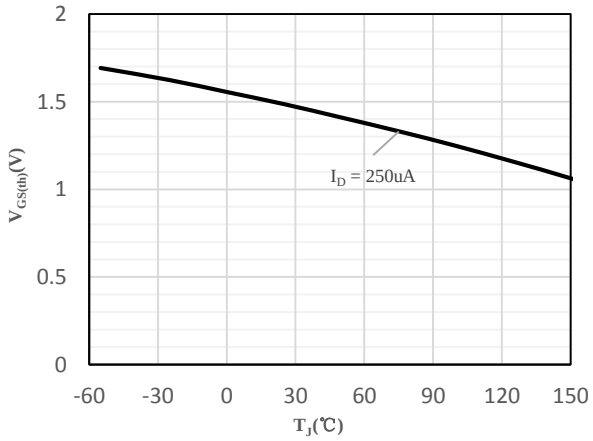
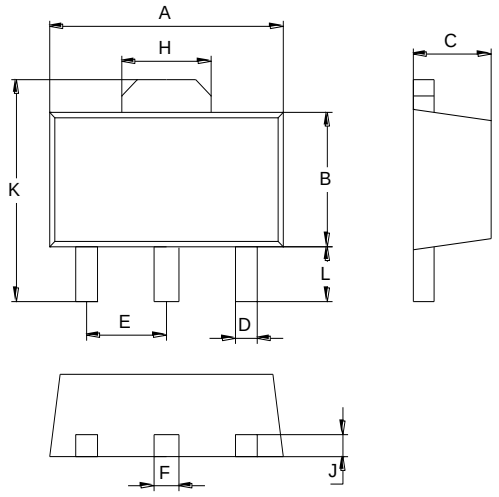


Fig 10 $V_{GS(th)}$ vs. Junction Temperature

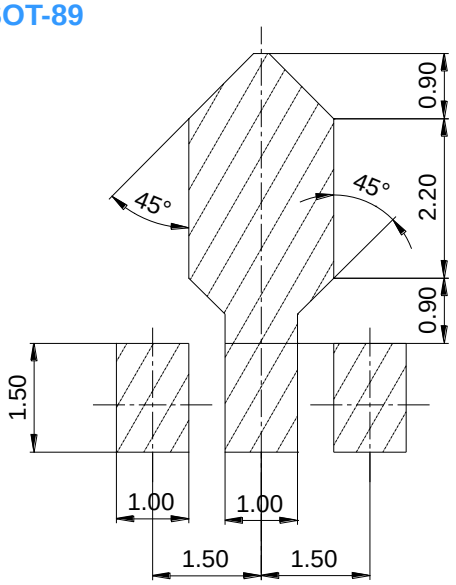
Package Outline Dimensions (Unit: mm)



SOT-89		
Dimension	**Min.**	**Max.**
A	4.30	4.70
B	2.25	2.65
C	1.30	1.70
D	0.30	0.50
E	1.40	1.60
F	0.38	0.58
H	1.60	1.80
J	0.30	0.50
L	0.90	1.10
K	3.95	4.35

Mounting Pad Layout (Unit: mm)

SOT-89



IMPORTANT NOTICE

Changzhou Galaxy Century Microelectronics (GME) reserves the right to make changes without further notice to any product information (copyrighted) herein to make corrections, modifications, improvements, or other changes. GME does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others.