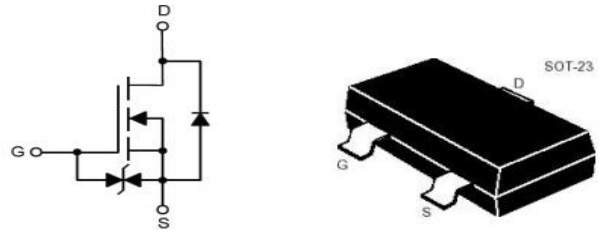


**SOT-23 60V N Channel ESD Protection 沟道带静电保护**  
**MOS Field Effect Transistor 场效应管**  
Q 代表 AEC-Q101 车规



■ **Absolute Maximum Ratings 最大额定值**

Characteristic 特性参数	Symbol 符号	Rat 额定值	Unit 单位
Drain-Source Voltage 漏极-源极电压	$BV_{DSS}$	60	V
Gate- Source Voltage 栅极-源极电压	$V_{GS}$	+20	V
Drain Current (continuous)漏极电流-连续	$I_D$ (at $T_A = 25^\circ C$ )	300	mA
Drain Current (pulsed)漏极电流-脉冲	$I_{DM}$	1.5	A
Total Device Dissipation 总耗散功率	$P_D$ (at $T_A = 25^\circ C$ )	300	mW
ESD Protected Up to 人体模式静电保护范围	ESD(HBM)	2.0	kV
Thermal Resistance Junction-Ambient 热阻	$R_{\theta JA}$	416	$^\circ C/W$
Junction/Storage Temperature 结温/储存温度	$T_J, T_{stg}$	-55~150	$^\circ C$

■ **Device Marking 产品字标**

2N7002KCQ=72KC.

■ Electrical Characteristics 电特性

( $T_A=25^{\circ}\text{C}$  unless otherwise noted 如无特殊说明, 温度为  $25^{\circ}\text{C}$ )

Characteristic 特性参数	Symbol 符号	Min 最小值	Typ 典型值	Max 最大值	Unit 单位
Drain-Source Breakdown Voltage 漏极-源极击穿电压( $I_D=250\mu\text{A}, V_{GS}=0\text{V}$ )	$BV_{DSS}$	60	—	—	V
Gate Threshold Voltage 栅极开启电压( $I_D=250\mu\text{A}, V_{GS}=V_{DS}$ )	$V_{GS(th)}$	1	1.5	2.5	V
Zero Gate Voltage Drain Current 零栅压漏极电流( $V_{GS}=0\text{V}, V_{DS}=60\text{V}$ )	$I_{DSS}$	—	—	1	$\mu\text{A}$
Gate Body Leakage 栅极漏电流( $V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$ )	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$
Static Drain-Source On-State Resistance 静态漏源导通电阻( $I_D=300\text{mA}, V_{GS}=10\text{V}$ ) ( $I_D=200\text{mA}, V_{GS}=4.5\text{V}$ )	$R_{DS(ON)}$	—	1.9 2.0	2.5 3.0	$\Omega$
Diode Forward Voltage Drop 内附二极管正向压降( $I_{SD}=300\text{mA}, V_{GS}=0\text{V}$ )	$V_{SD}$	—	—	1.2	V
Input Capacitance 输入电容 ( $V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$ )	$C_{ISS}$	—	27	—	pF
Common Source Output Capacitance 共源输出电容( $V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$ )	$C_{OSS}$	—	3	—	pF
Reverse Transfer Capacitance 反馈电容( $V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$ )	$C_{RSS}$	—	2	—	pF
Total Gate Charge 栅极电荷密度 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, V_{GS}=10\text{V}$ )	$Q_g$	—	1.65	—	nC
Gate Source Charge 栅源电荷密度 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, V_{GS}=10\text{V}$ )	$Q_{gs}$	—	0.5	—	nC
Gate Drain Charge 栅漏电荷密度 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, V_{GS}=10\text{V}$ )	$Q_{gd}$	—	0.3	—	nC
Turn-ON Delay Time 开启延迟时间 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, R_{GEN}=6\Omega, V_{GS}=10\text{V}$ )	$t_{d(on)}$	—	6.5	—	ns
Turn-ON Rise Time 开启上升时间 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, R_{GEN}=6\Omega, V_{GS}=10\text{V}$ )	$t_r$	—	16	—	ns
Turn-OFF Delay Time 关断延迟时间 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, R_{GEN}=6\Omega, V_{GS}=10\text{V}$ )	$t_{d(off)}$	—	9.6	—	ns
Turn-OFF Fall Time 关断下降时间 ( $V_{DS}=30\text{V}, I_D=300\text{mA}, R_{GEN}=6\Omega, V_{GS}=10\text{V}$ )	$t_f$	—	80	—	ns

■ Typical Characteristic Curve 典型特性曲线

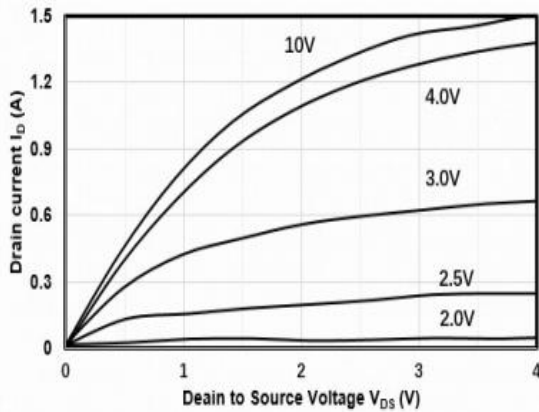


Figure 1: Output Characteristics

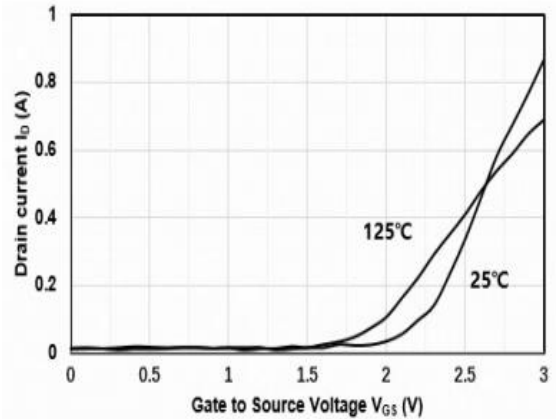


Figure 2: Transfer Characteristics

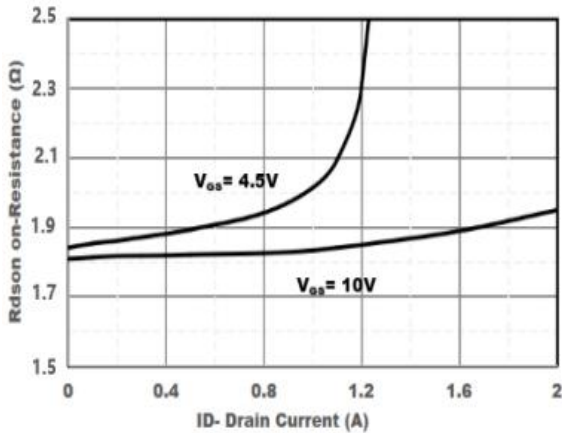


Figure 3: On-Resistance vs. Drain Current

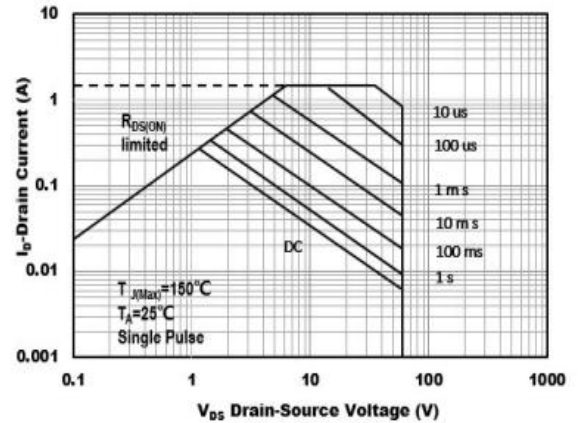


Figure 4: Safe Operating Area

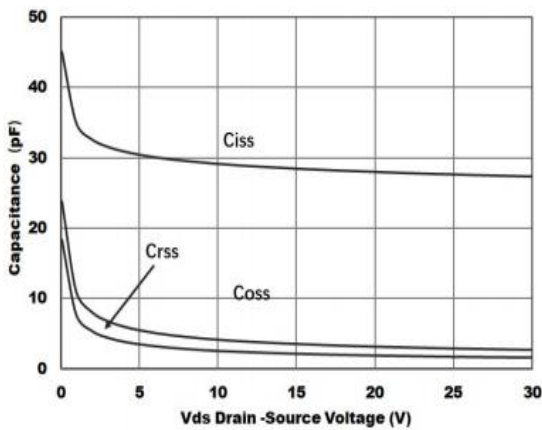


Figure 5: Capacitance Characteristics

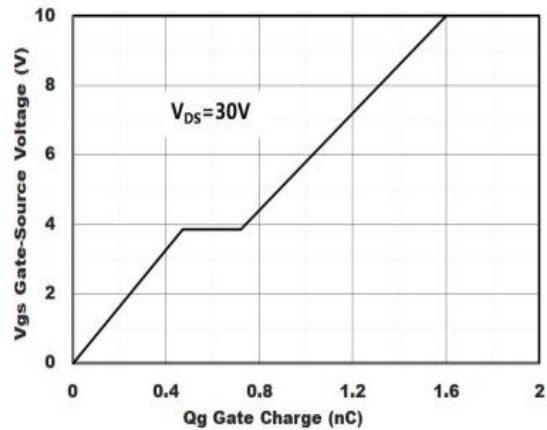
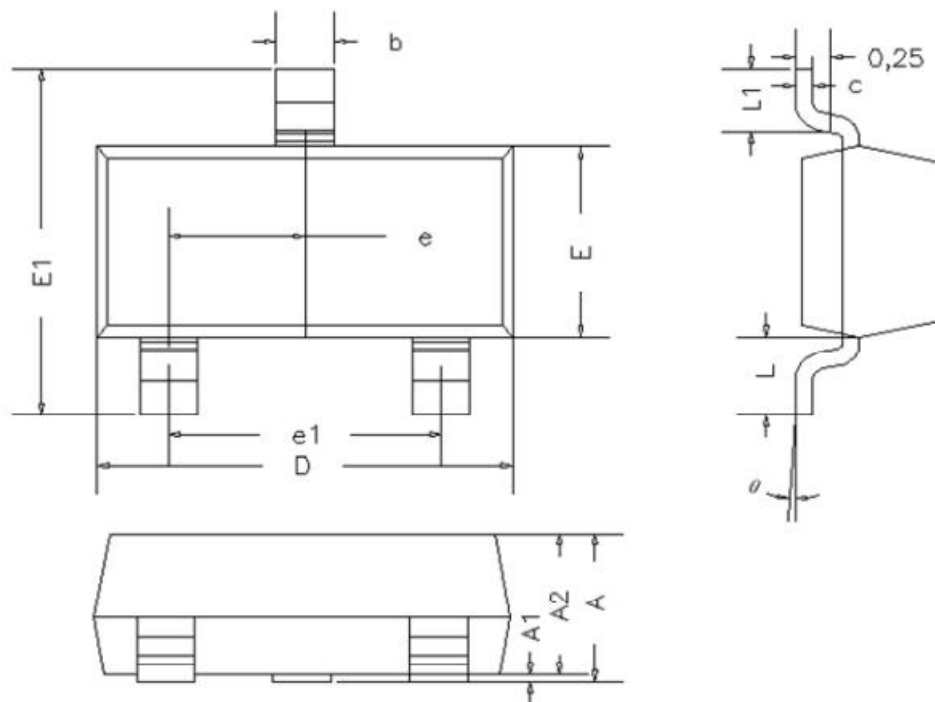


Figure 6: Gate-Charge Characteristics

■ Dimension 外形封装尺寸



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.035	0.045	0.90	1.15	
A1	0.000	0.004	0.00	0.10	
A2	0.035	0.041	0.90	1.05	
b	0.012	0.020	0.30	0.50	
c	0.004	0.008	0.10	0.20	
D	0.110	0.118	2.80	3.00	
E	0.047	0.055	1.20	1.40	
E1	0.089	0.100	2.25	2.55	
e	0.370TYP		0.95TYP		
e1	0.071	0.079	1.80	2.00	
L	0.220REF		0.55REF		
L1	0.012	0.020	0.30	0.50	
θ	0°	8°	0°	8°	