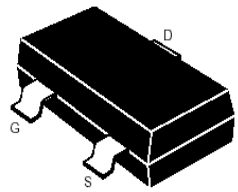
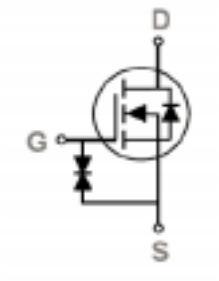
SOT-23





$V_{(BR)DSS}$	$R_{DS(ON)}$ Typ	I_D Max
60V	2mΩ @ 10V	380mA

Features

Split gate trench MOSFET technology
Excellent package for heat dissipation
High density cell design for low $R_{DS(ON)}$
5V Logic Level Control
HMB ESD Protection 2 *KV*

Mechanical Data

SOT-23 Small Outline Plastic Package
Epoxy UL: 94V-0

Applications

Battery Protection and Load Switch
Voltage Regulator Modules
Point-of-Load(POL) Modules
Brushed and Brushless Motor Control

Summary of Packing Options

Product	Package	Packing Quantity	Making
2N7002K	SOT-23	3000 / Reel	72K

Maximum Ratings & Thermal Characteristics

(Ratings at 25℃ ambient temperature unless otherwise specified.)

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±20	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		60	V
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-50 to 150	°C
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested①	T_A=25°C	1.2	A
I_D	Continuous Drain Current(V_{GS}=4.5V)	T_A=25°C	380	mA
		T_A=70°C	240	
P_D	Maximum Power Dissipation	T_A=25°C	0.35	W
		T_A=70°C	0.2	
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		400	°C/W

Electrical Characteristics & Source-Drain Diode Characteristics

（Ratings at 25℃ ambient temperature unless otherwise specified).

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(T_A=25℃)	V_{DS}=60V, V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T_A=125℃)	V_{DS}=48V, V_{GS}=0V	--	--	100	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	--	--	±10	uA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.0	1.3	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance②	V_{GS}=10V, I_D=0.5A	--	1.9	2.85	Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance②	V_{GS}=4.5V, I_D=0.2A	--	2.5	4	Ω
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=30V, V_{GS}=0V, f=1MHz	--	16	--	pF
C_{oss}	Output Capacitance		--	3.8	--	pF
C_{rss}	Reverse Transfer Capacitance		--	0.6	--	pF
Q_g	Total Gate Charge	V_{DS}=30V I_D=0.5A, V_{GS}=10V	--	0.72	--	nC
Q_{gs}	Gate Source Charge		--	0.15	--	nC
Q_{gd}	Gate Drain Charge		--	0.22	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn on Delay Time	V_{DD}=30V, I_D=0.3A, R_G=3.3Ω, V_{GS}=10V	--	5	--	ns
t_r	Turn on Rise Time		--	3.3	--	ns
$t_{d(off)}$	Turn Off Delay Time		-	18	--	ns
t_f	Turn Off Fall Time		--	5.2	--	ns
Source Drain Diode Characteristics						
I_{SD}	Source drain current(Body Diode)	T_A=25℃	--	--	0.5	A
V_{SD}	Forward on voltage②	T_j=25℃, I_{SD}=0.5A, V_{GS}=0V	--	0.73	1.2	V

Notes:

① Pulse width limited by maximum allowable junction temperature

②Pulse test ; Pulse width≤300μs, duty cycle≤2%.

Typical Characteristics

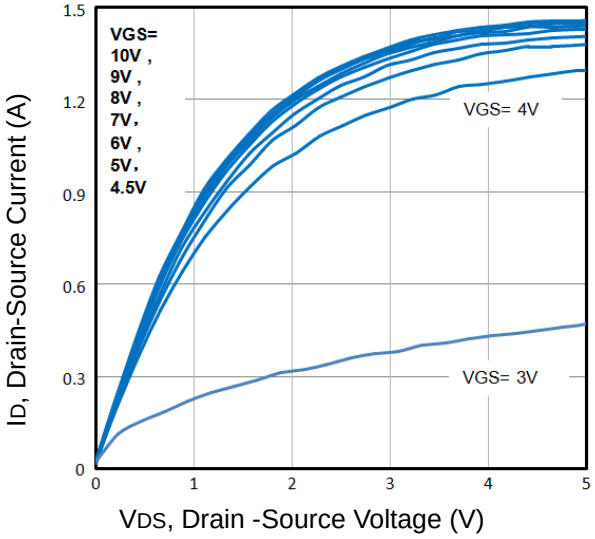


Fig1. Typical Output Characteristics

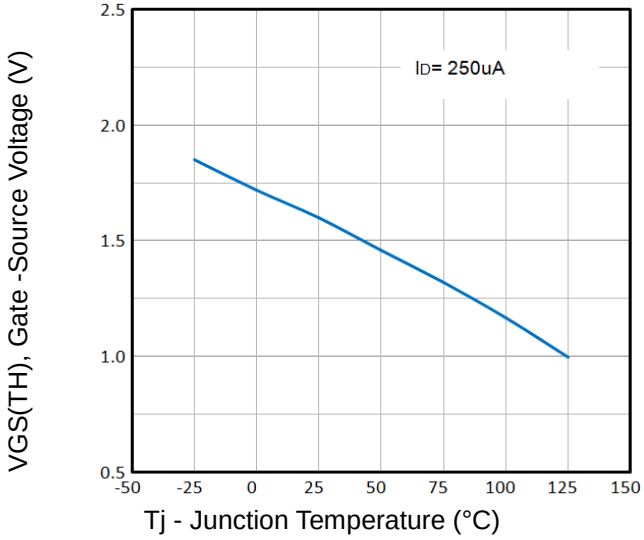


Fig2. Normalized Threshold Voltage Vs. Temperature

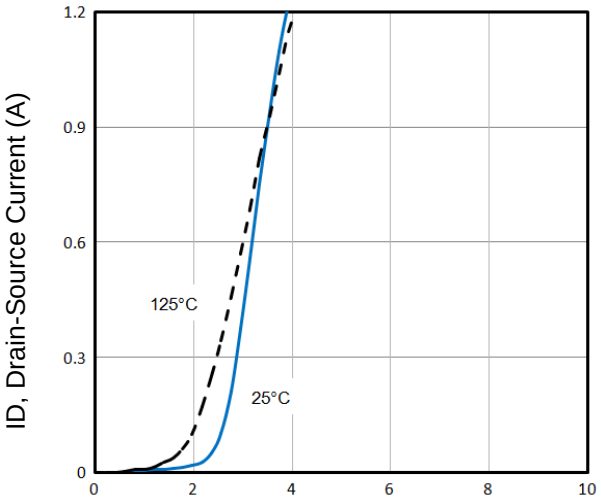


Fig3. Typical Transfer Characteristics

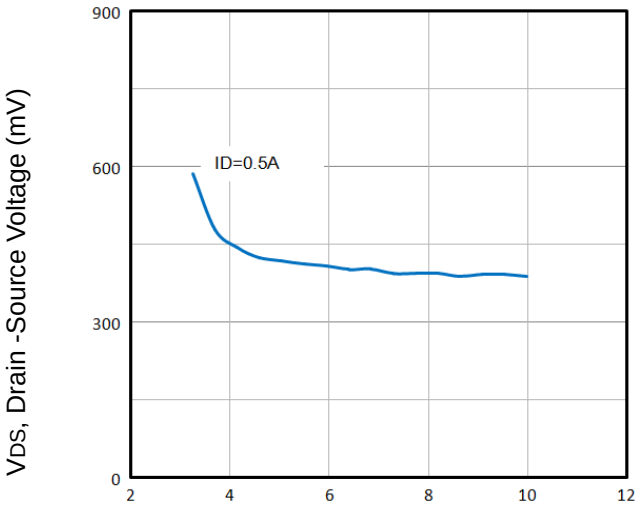


Fig4. Drain -Source Voltage vs Gate -Source Voltage

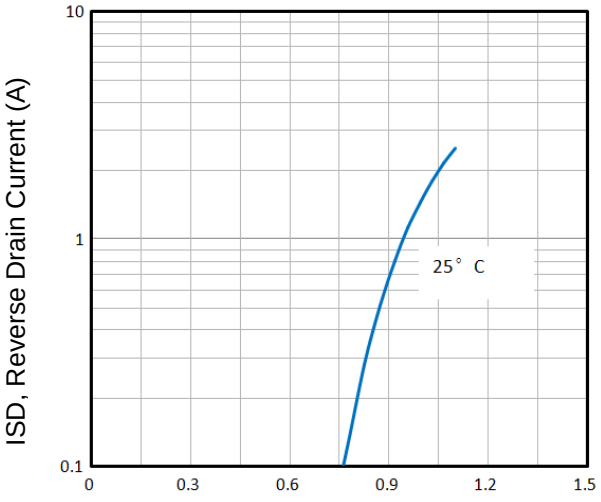


Fig5. Typical Source-Drain Diode Forward Voltage

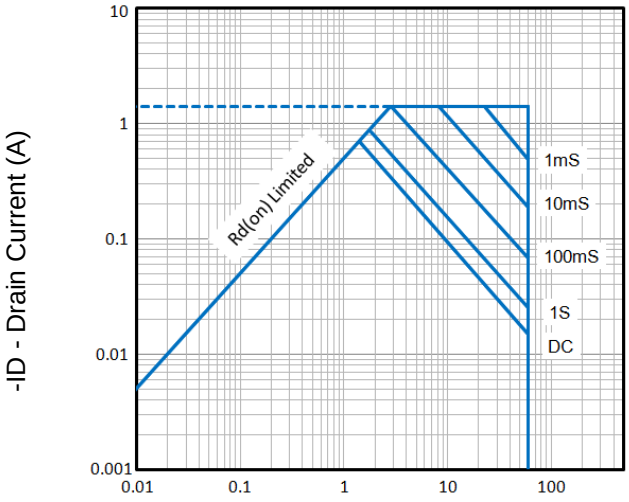


Fig6. Maximum Safe Operating Area

Typical Characteristics

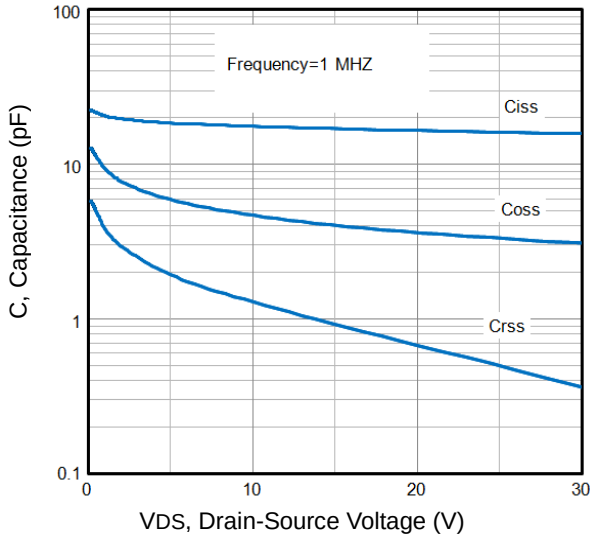


Fig7. Typical Capacitance Vs. Drain-Source Voltage

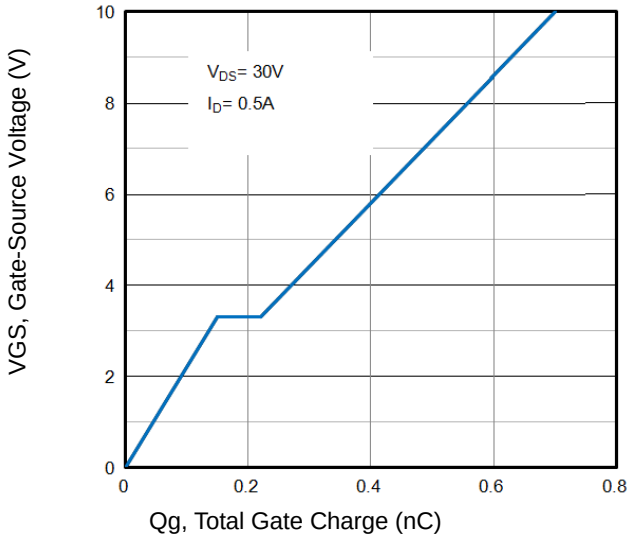
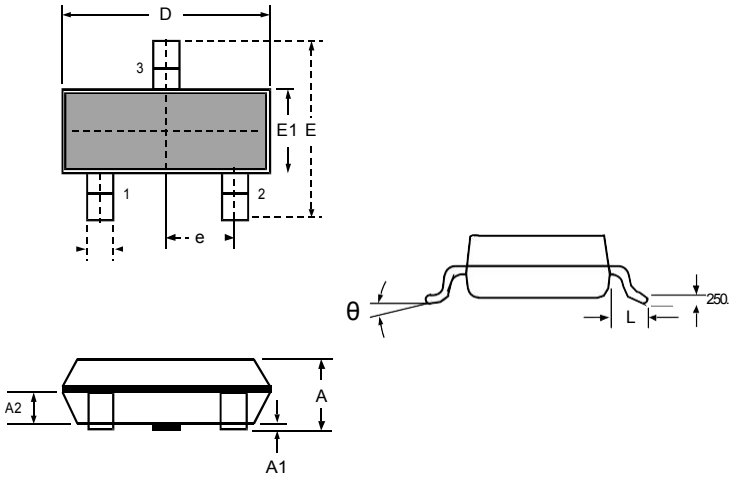


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

Package Outline Dimensions: SOT-23



DIMENSIONS

SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
D	2.800	3.000	0.110	0.118
b	0.300	0.500	0.012	0.020
E	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	0.950 BSC		0.037 BSC	
L	0.300	0.500	0.012	0.020
θ	0	8°	0	8°