N-Channel Enhancement Mode Field Effect Transistor

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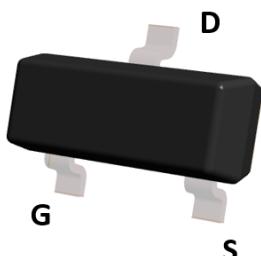
Top View
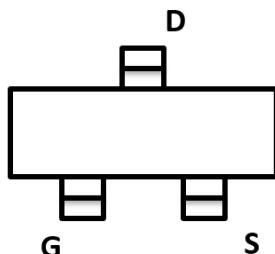
SOT-23
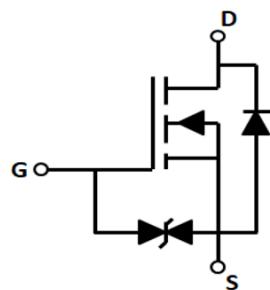
Product Summary

- V_{DS} 60V
- I_D 340mA
- $R_{DS(ON)}$(at V_{GS}=10V)   ＜2.5ohm
- $R_{DS(ON)}$(at V_{GS}=4.5V)   ＜3.0ohm
- ESD Protected Up to 2.5KV (HBM)

General Description

- Trench Power MV MOSFET technology
- Voltage controlled small signal switch
- Low input Capacitance
- Fast Switching Speed
- Low Input / Output Leakage

Applications

- Battery operated systems
- Solid-state relays
- Direct logic-level interface：TTL/CMOS

■ Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	60	V
Gate-source Voltage		V_{GS}	±20	V
Drain Current	T_A=25℃ @ Steady State	I_D	340	mA
	T_A=70℃ @ Steady State		272	
Pulsed Drain Current [A]		I_{DM}	1.5	A
Total Power Dissipation @ T_A=25℃		P_D	350	mW
Thermal Resistance Junction-to-Ambient @ Steady State [B]		$R_{\theta JA}$	357	℃/ W
Junction and Storage Temperature Range		T_J ,T_{STG}	-55～+150	℃

■ Ordering Information (Example)

PREFERED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
2N7002K	F2	72K.	3000	30000	120000	7" reel

2N7002K

■ Electrical Characteristics (T$_J$=25℃ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$= 0V, I$_D$=250μA	60			V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$=60V,V$_{GS}$=0V			1	μA
Gate-Body Leakage Current	I$_{GSS1}$	V$_{GS}$= ±20V, V$_{DS}$=0V			±9	μA
	I$_{GSS2}$	V$_{GS}$= ±10V, V$_{DS}$=0V			±200	nA
	I$_{GSS3}$	V$_{GS}$= ±5V, V$_{DS}$=0V			±100	nA
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$= V$_{GS}$, I$_D$=250μA	1	1.4	2.5	V
Static Drain-Source On-Resistance	R$_{DS(ON)}$	V$_{GS}$= 10V, I$_D$=300mA		1.3	2.5	Ω
		V$_{GS}$= 4.5V, I$_D$=200mA		1.4	3.0	
Diode Forward Voltage	V$_{SD}$	I$_S$=300mA,V$_{GS}$=0V			1.2	V
Maximum Body-Diode Continuous Current	I$_S$				340	mA
Dynamic Parameters						
Input Capacitance	C$_{iss}$	V$_{DS}$=30V,V$_{GS}$=0V,f=1MHZ		17		pF
Output Capacitance	C$_{oss}$			11		
Reverse Transfer Capacitance	C$_{rss}$			6		
Switching Parameters						
Total Gate Charge	Q$_g$	V$_{GS}$=10V,V$_{DS}$=30V,I$_D$=0.3A		1.7	2.4	nC
Turn-on Delay Time	t$_{D(on)}$	V$_{GS}$=10V,V$_{DD}$=30V, I$_D$=300mA, R$_{GEN}$=6Ω		5		ns
Turn-off Delay Time	t$_{D(off)}$			17		
Reverse recovery Time	t$_{rr}$	V$_{GS}$=0V,I$_S$=300mA,V$_R$=25V, dI$_S$/dt=-100A/μs		30		ns

A. Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.
B. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

# ■ Typical Performance Characteristics
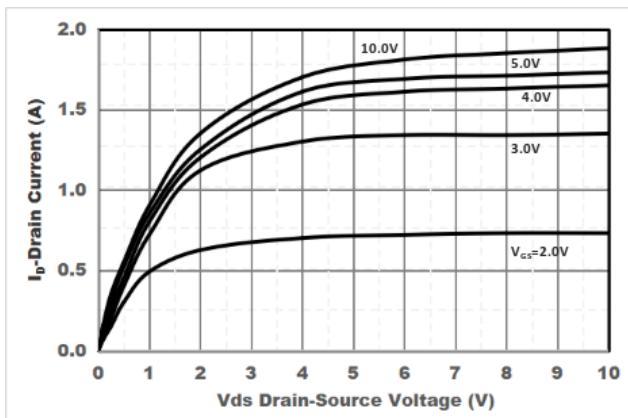

Figure1. Output Characteristics
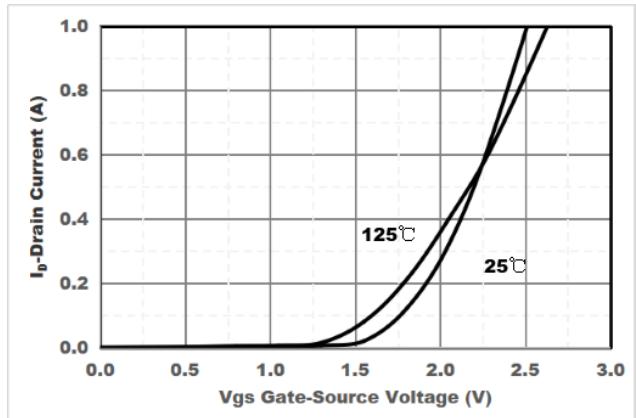

Figure2. Transfer Characteristics
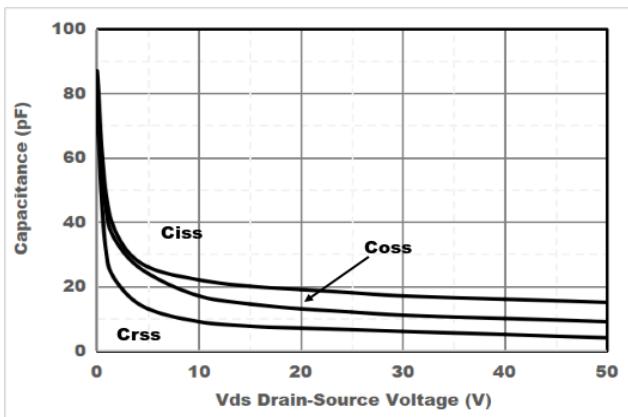
Figure3. Capacitance Characteristics
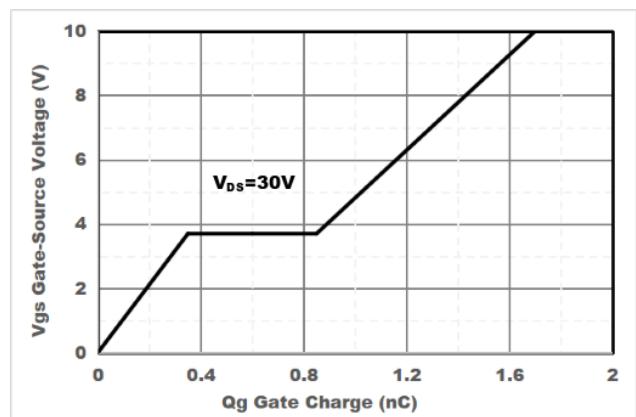
Figure4. Gate Charge
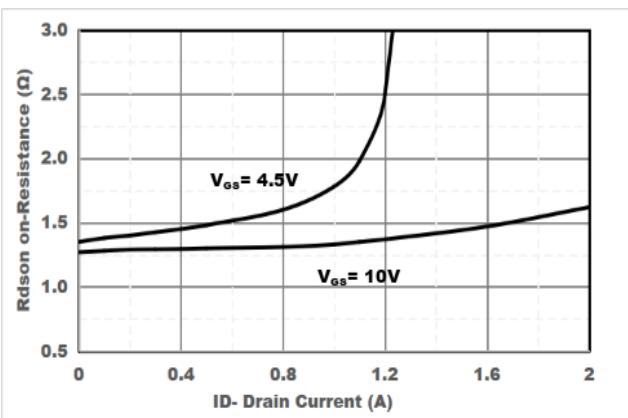

Figure5. Drain-Source on Resistance
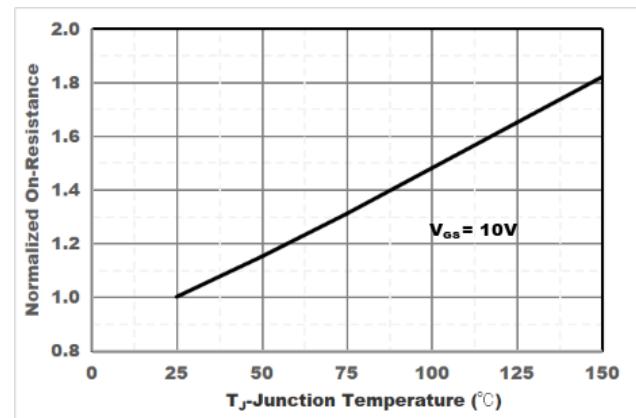
Figure6. Drain-Source on Resistance
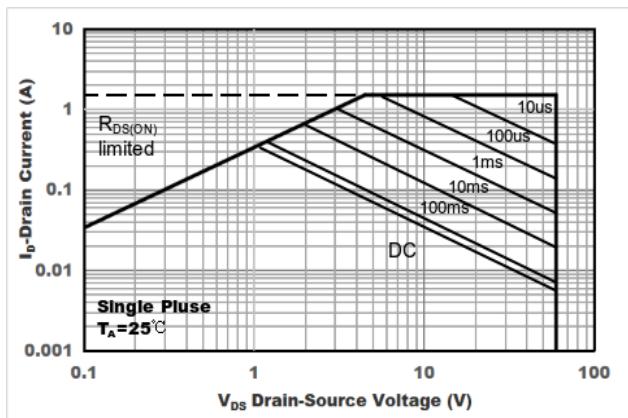
Figure7. Safe Operation Area
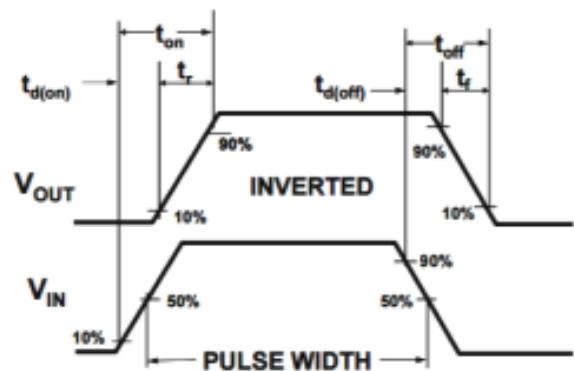
Figure8. Switching wave

## ■ SOT-23 Package information
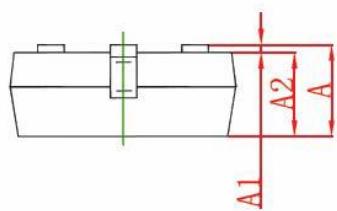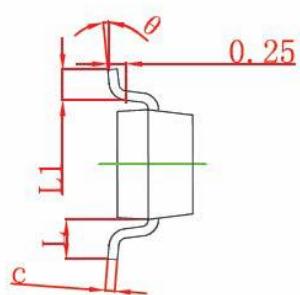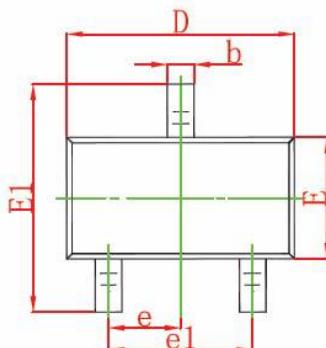
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

■SOT-23 Suggested Pad Layout
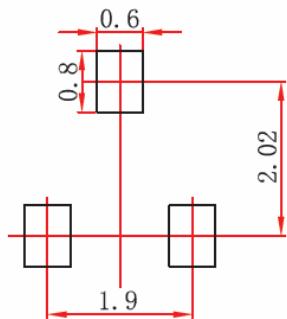
Note:
1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05mm.
3. The pad layout is for reference purposes only.

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