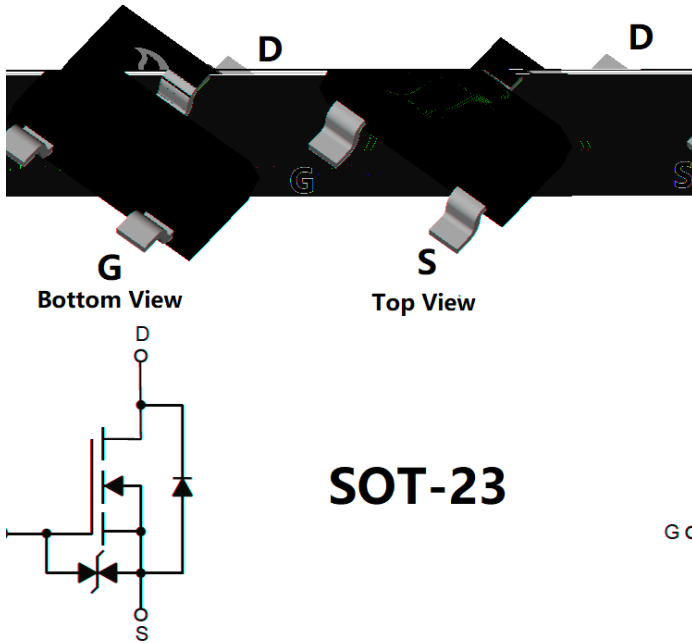




# 2N7002KC

## N-Channel Enhancement Mode Field Effect Transistor



### SOT-23

### Product Summary

$V_{DS}$	60V
$I_D$	300mA
$R_{DS(ON)}$ ( at $V_{GS}=10V$ )	2.5ohm
$R_{DS(ON)}$ ( at $V_{GS}=4.5V$ )	3.0ohm
Gate-Source ESD Rating Up to 2KV (HBM)	

### General Description

- Trench Power MV MOSFET technology
- Voltage controlled small signal switch
- Low input Capacitance
- Fast Switching Speed
- Low Input / Output Leakage
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### 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	$I_D$	$T_A=25$ @ Steady State	300
		$T_A=70$ @ Steady State	240
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	1.5	A
Total Power Dissipation @ $T_A=25$	$P_D$	300	mW
Thermal Resistance Junction-to-Ambient @ Steady State <sup>B</sup>	$R_{JA}$	416	/ W
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 +150	

### Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
2N7002KC	F2	72KC.	3000	30000	120000	reel



# 2N7002KC

## Electrical Characteristics (T<sub>J</sub>=25 unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250	60			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V			1	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 20V, V <sub>DS</sub> =0V			10	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250	1	1.5	2.5	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> =300mA		1.9	2.5	
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> =200mA		2.0	3.0	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =300mA, V <sub>GS</sub> =0V			1.2	V
Maximum Body-Diode Continuous Current	I <sub>S</sub>				300	mA
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =0.3A		0.13		S
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHZ		21		pF
Output Capacitance	C <sub>oss</sub>			9		
Reverse Transfer Capacitance	C <sub>rss</sub>			4		
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =0.3A		1.22	2.4	nC
Gate-Source Charge	Q <sub>gs</sub>			0.5		
Gate-Drain Charge	Q <sub>gd</sub>			0.18		
Reverse Recovery Charge	Q <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =300mA, V <sub>R</sub> =25V, di/dt=100A/ s		3.6		
Reverse Recovery Time	t <sub>rr</sub>			16		
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, I <sub>D</sub> =200mA, R <sub>GEN</sub> =50		7		ns
Turn-on Rise Time	t <sub>r</sub>			19		
Turn-off Delay Time	t <sub>D(off)</sub>			20		
Turn-off fall Time	t <sub>f</sub>			84		

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

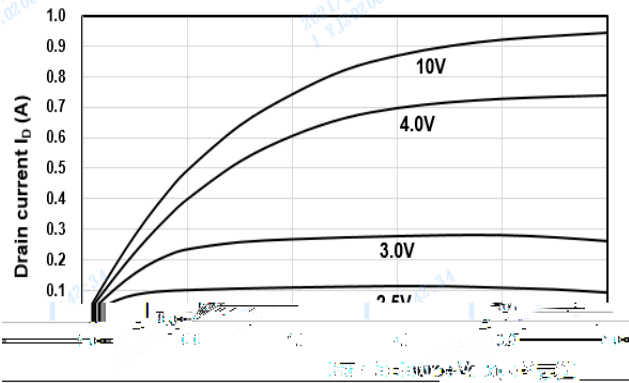


Figure1. Output Characteristics

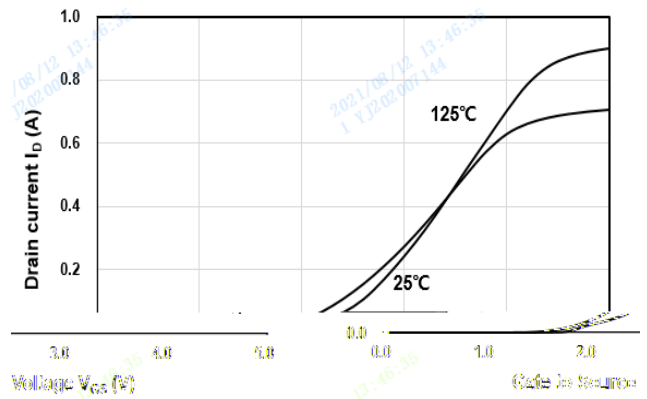


Figure2. Transfer Characteristics

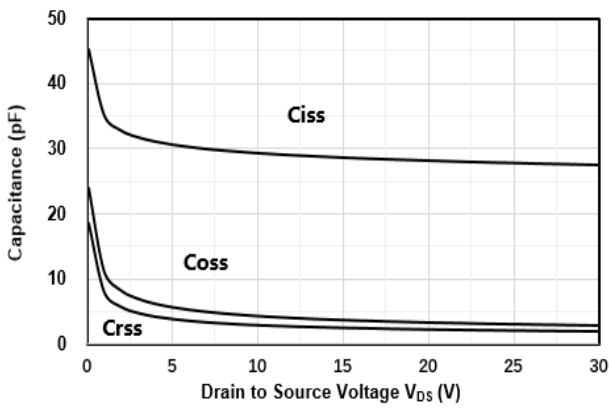


Figure3. Capacitance Characteristics

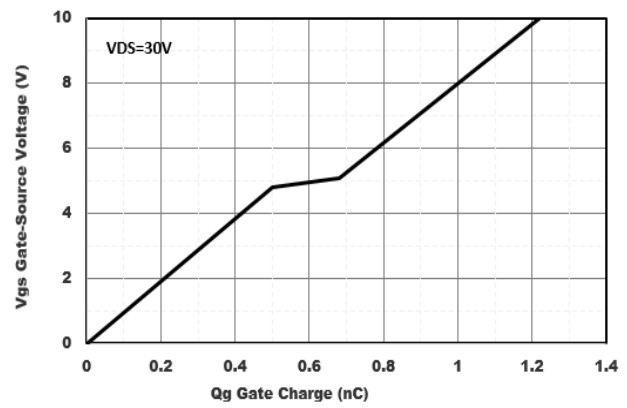


Figure4. Gate Charge

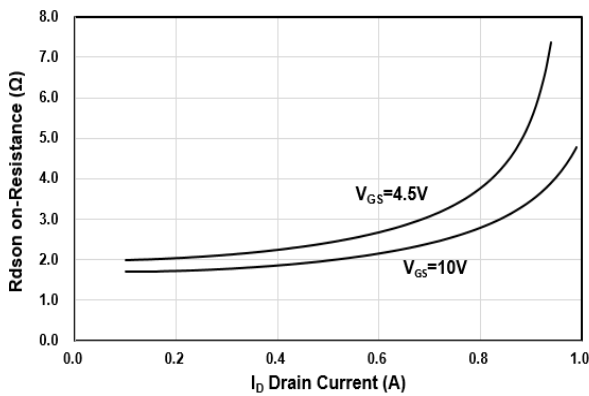


Figure5. Drain-Source on Resistance

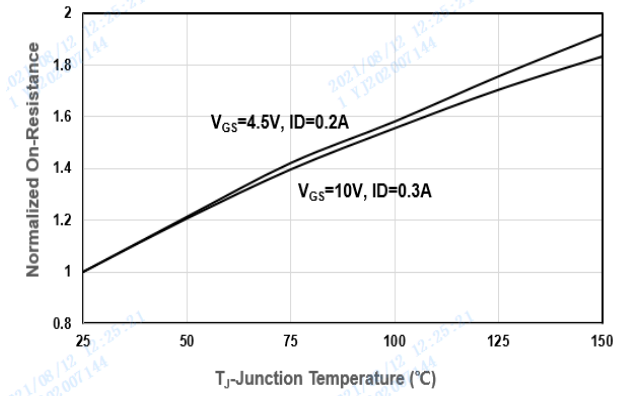


Figure6. Drain-Source on Resistance



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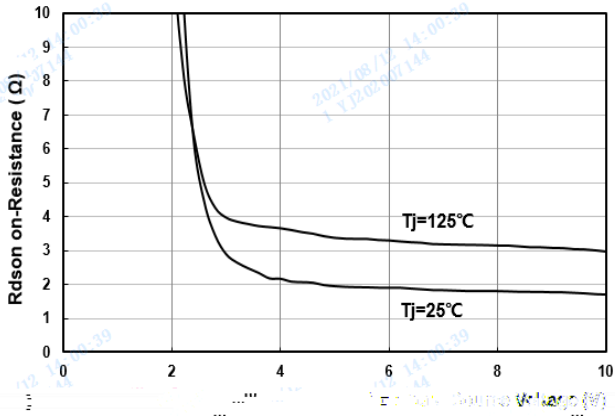


Figure 7. On-Resistance vs  $V_{GS}$

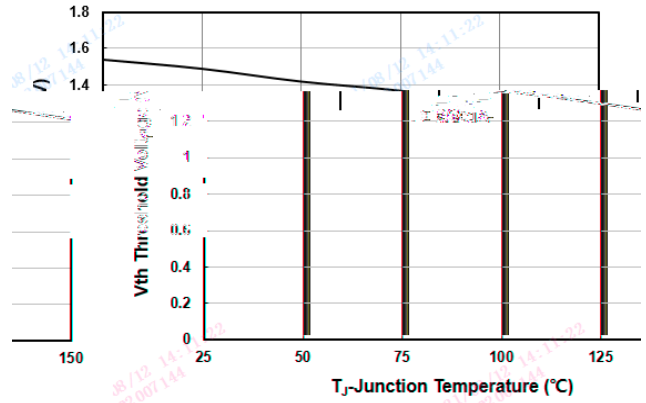


Figure 8. Threshold Voltage vs Temperature

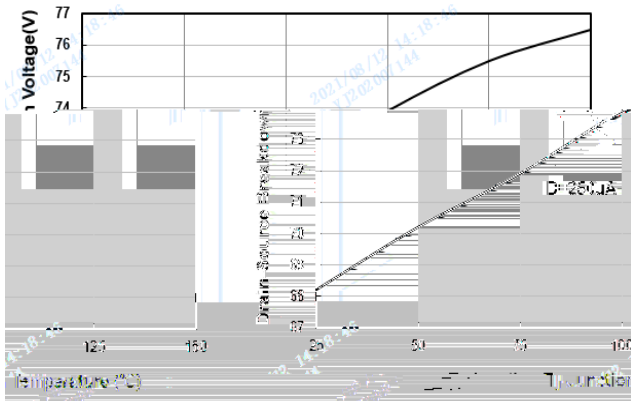


Figure 9. Breakdown Voltage vs Temperature

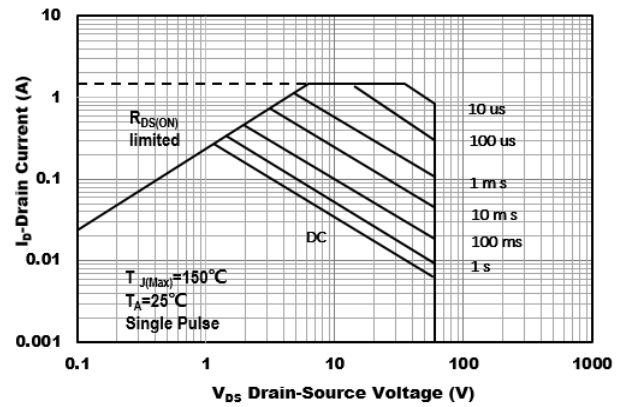


Figure 10. Safe Operation Area

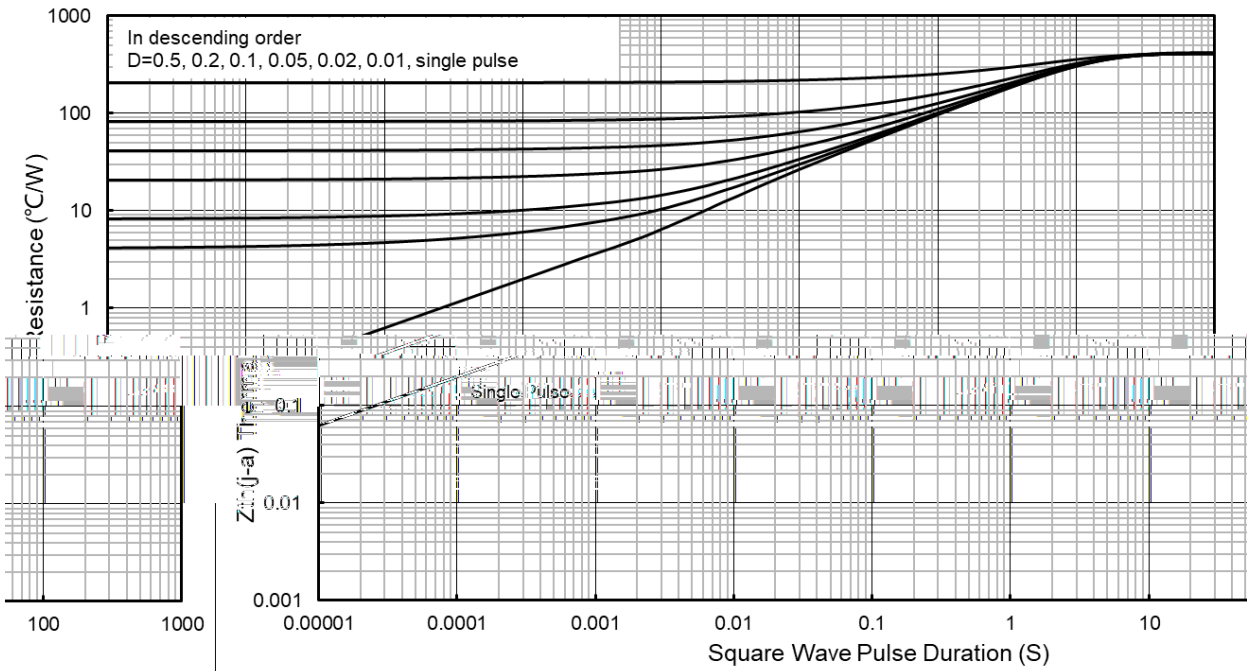
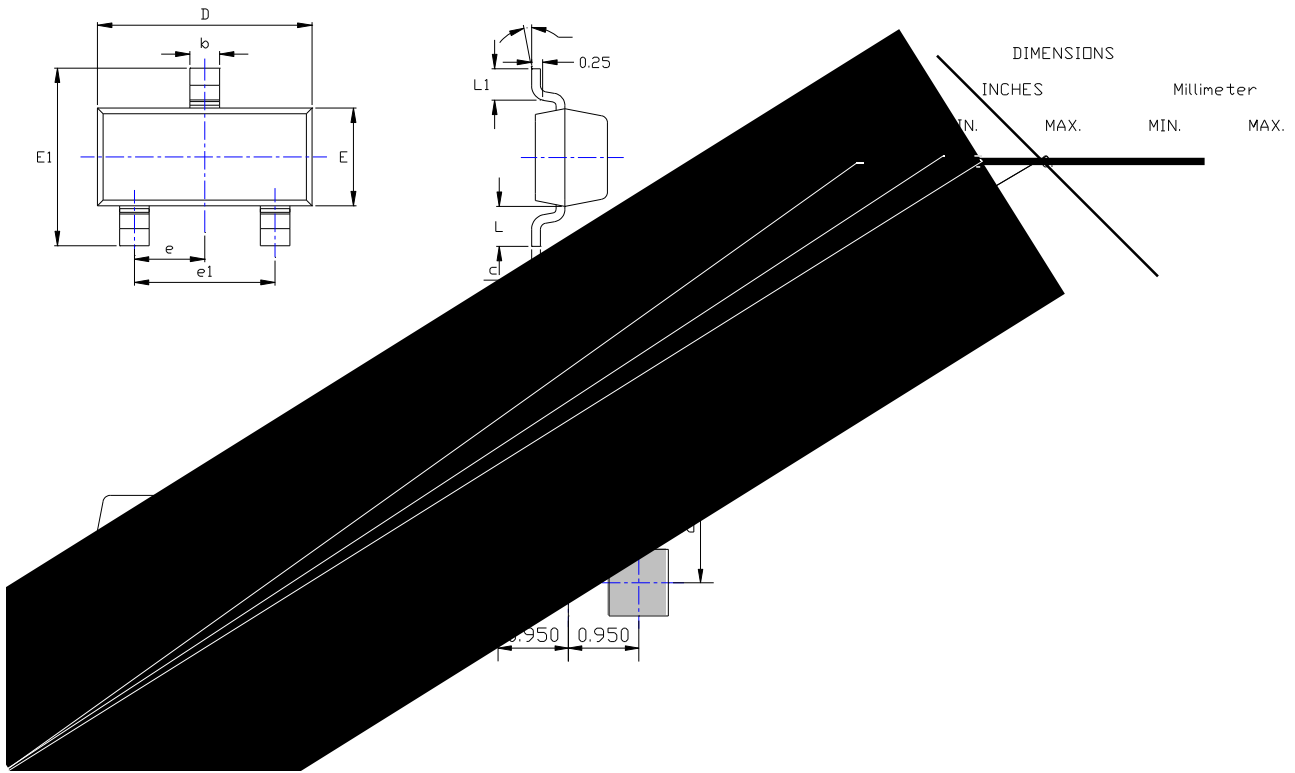


Figure 11. Maximum Transient Thermal Impedance



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## SOT-23 Package information





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