

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

## 2N7002KN3T5G

Product specification

## Features

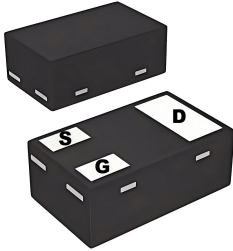
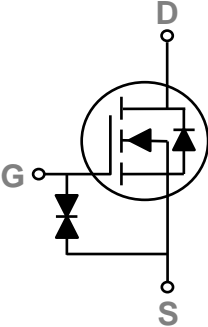

- 60V,300mA,  $R_{DS(ON)} = 1.7\Omega @ V_{GS} = 10V$
- Fast switching
- Green Device Available
- 2KV HBM ESD Capability

## Reference News

- Notebook
- Smartphone
- Battery Protection
- Hand-held Instruments

BVDSS	RDSON	ID
60V	1.6Ω	300mA

## Reference News

PACKAGE OUTLINE	PIN Configuration	Marking
 SOT-883		

## Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_A=25^\circ\text{C}$ )	300	mA
	Drain Current - Continuous ( $T_A=70^\circ\text{C}$ )	160	mA
$I_{DM}$	Drain Current - Pulsed <sup>1</sup>	800	mA
$P_D$	Power Dissipation ( $T_A=25^\circ\text{C}$ )	156	mW
	Power Dissipation - Derate above $25^\circ\text{C}$	1.25	mW/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	800	$^\circ\text{C}/\text{W}$

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

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	60	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =60V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =48V , V <sub>GS</sub> =0V , T <sub>J</sub> =125°C	---	---	10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V	---	---	±10	uA

### On Characteristics

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V , I <sub>D</sub> =0.3A	---	1.7	3	Ω
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =0.2A	---	2.2	4	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	2	2.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V , I <sub>D</sub> =0.1A	---	0.3	---	S

### Dynamic and switching Characteristics

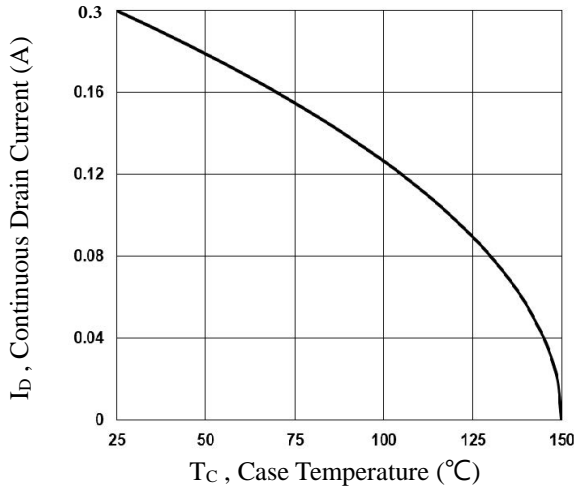
Q <sub>g</sub>	Total Gate Charge <sup>2, 3</sup>	V <sub>DS</sub> =30V , V <sub>GS</sub> =10V , I <sub>D</sub> =0.1A	---	3.5	---	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2, 3</sup>		---	1.4	---	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2, 3</sup>		---	0.2	---	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2, 3</sup>	V <sub>DD</sub> =30V , V <sub>GS</sub> =10V , R <sub>G</sub> =6Ω I <sub>D</sub> =0.1A	---	3.5	---	ns
T <sub>r</sub>	Rise Time <sup>2, 3</sup>		---	5	---	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2, 3</sup>		---	21	---	
T <sub>f</sub>	Fall Time <sup>2, 3</sup>		---	21	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V , V <sub>GS</sub> =0V , F=1MHz	---	15	---	pF
C <sub>oss</sub>	Output Capacitance		---	2	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	1	---	

### Drain-Source Diode Characteristics and Maximum Ratings

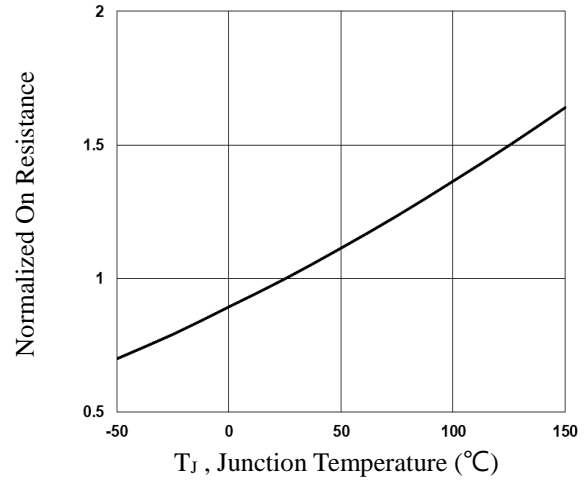
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	300	mA
I <sub>SM</sub>	Pulsed Source Current		---	---	400	mA
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V , I <sub>S</sub> =0.1A , T <sub>J</sub> =25°C	---	---	1.3	V
T <sub>rr</sub>	Reverse Recovery Time	V <sub>R</sub> =50V , I <sub>S</sub> =0.1A ,	---	21	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge	dI/dt=100A/μs , T <sub>J</sub> =25°C	---	6	---	nC

Note :

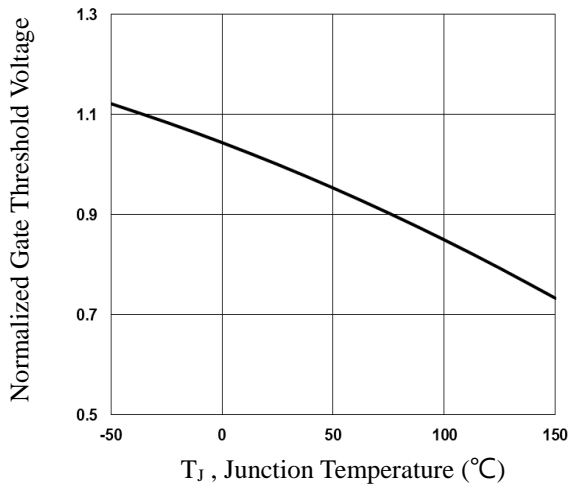
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



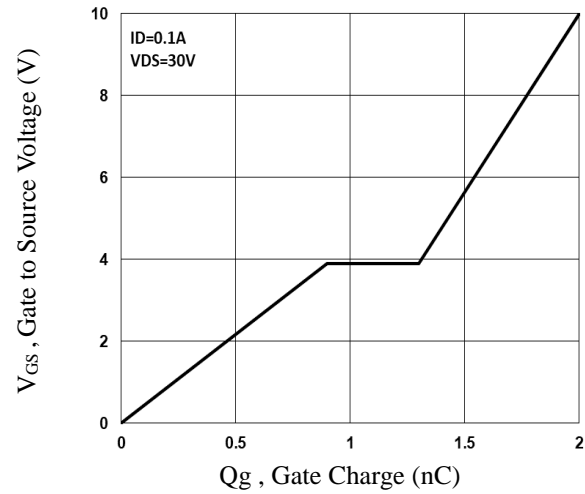
**Fig.1 Continuous Drain Current vs.  $T_c$**



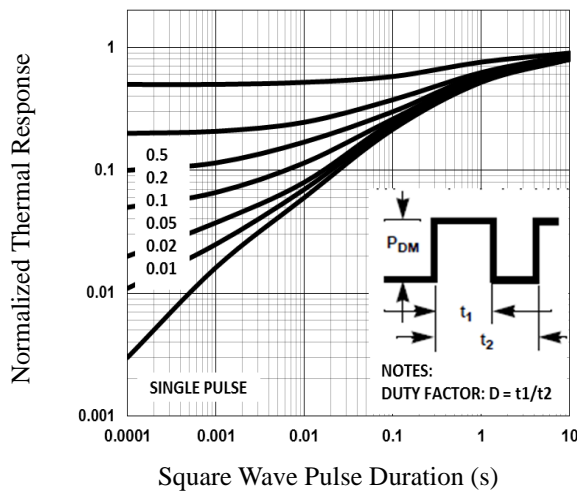
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



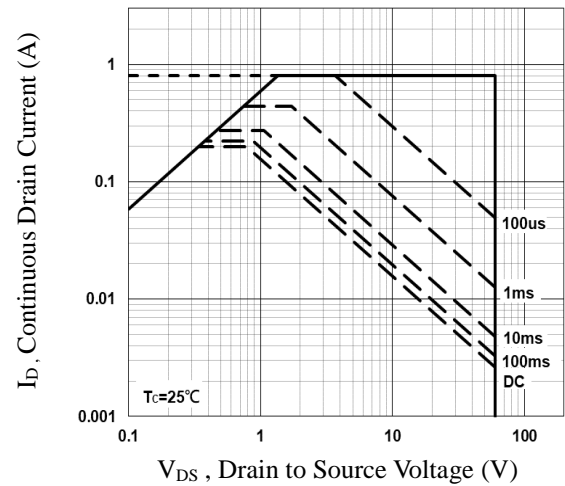
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



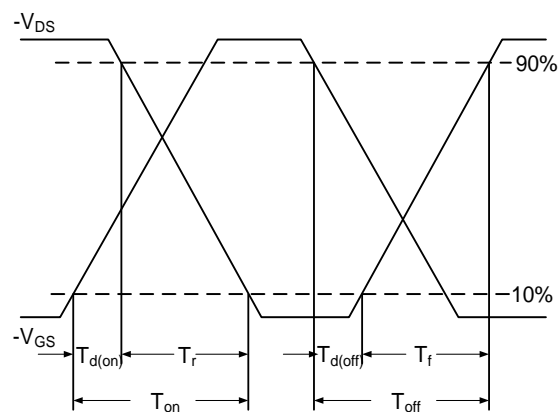
**Fig.4 Gate Charge Waveform**



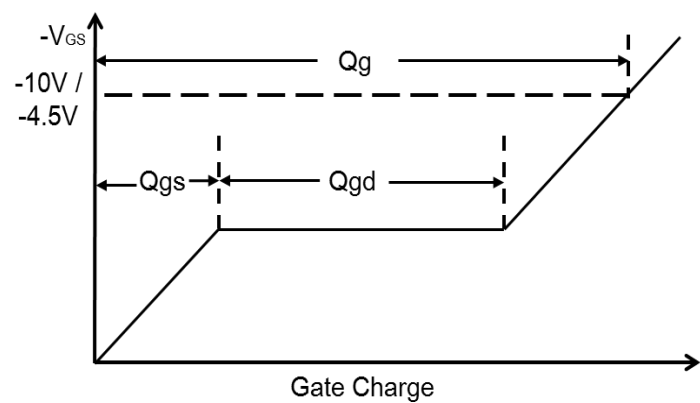
**Fig.5 Normalized Transient Response**



**Fig.6 Maximum Safe Operation Area**

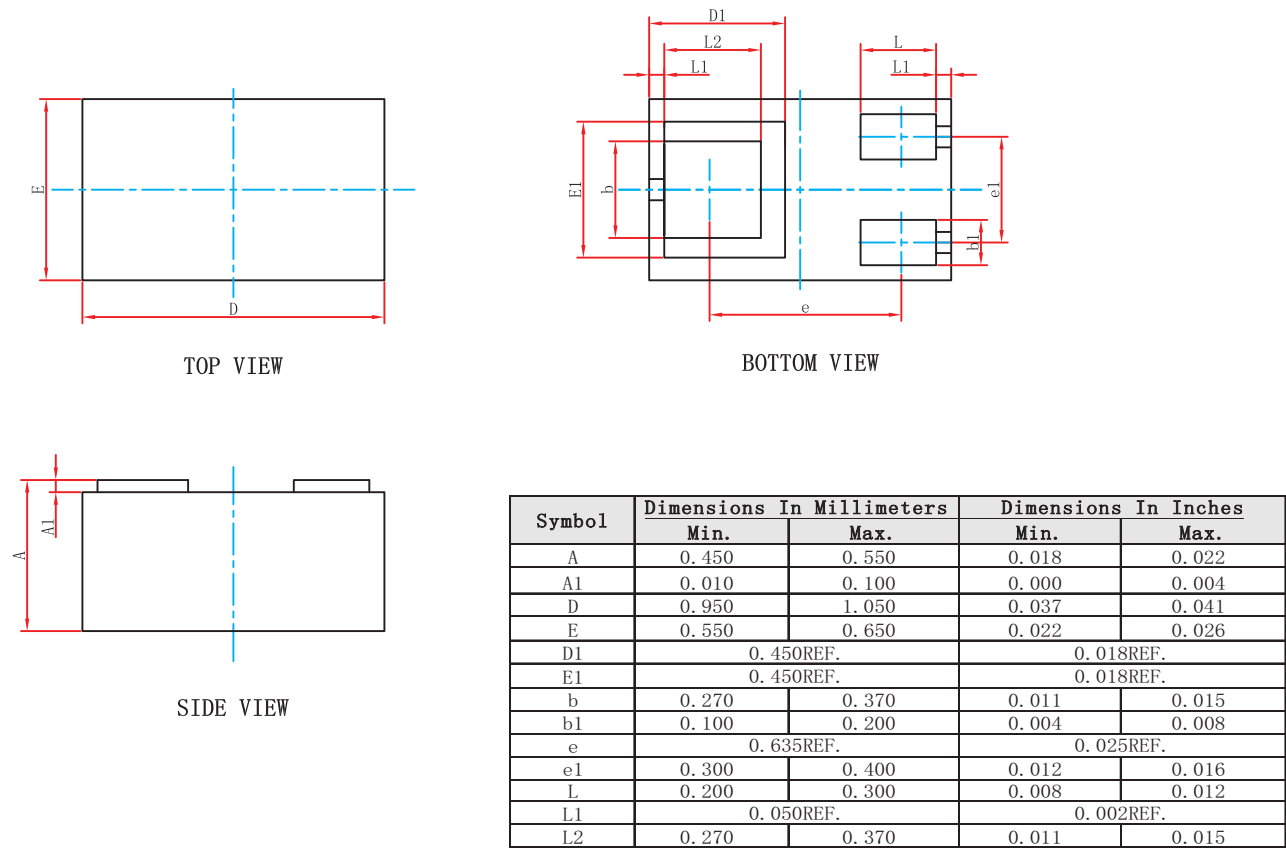


**Fig.7 Switching Time Waveform**

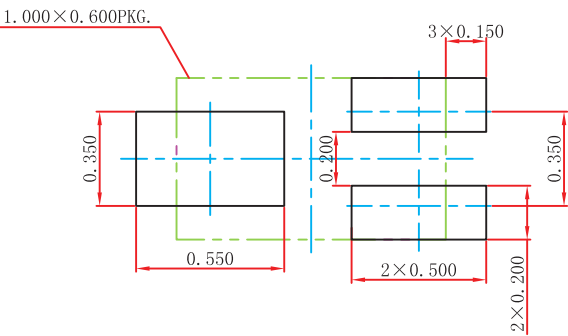


**Fig.8 Gate Charge Waveform**

Package Outline Dimensions



Suggested Pad Layout



**Note:**  
1.Controlling dimension:in millimeters.  
2.General tolerance:± 0.050mm.  
3.The pad layout is for reference purposes only.

REELSPECIFICATION

P/N	PKG	QTY
2N7002KN3T5G	SOT-883	10000

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