

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

2N7002T-MS

Product specification

Features

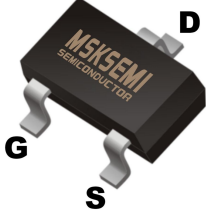
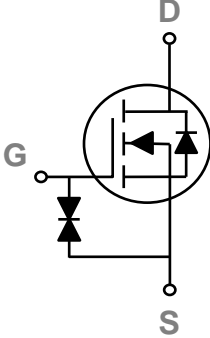

- 60V,300mA, $R_{DS(ON)} = 2.2\Omega @ V_{GS} = 10V$
- Fast switching
- Green Device Available
- 2KV HBM ESD Capability

Reference News

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

BVDSS	RDSON	ID
60V	2.2Ω	300mA

Reference News

PACKAGE OUTLINE	PIN Configuration	Marking
 SOT-523		

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	± 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 ¹	800	mA
P_D	Power Dissipation ($T_A=25^\circ\text{C}$)	156	mW
	Power Dissipation - Derate above 25°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_J=25 °C, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	60	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =60V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =48V , V _{GS} =0V , T _J =125°C	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ±20V , V _{DS} =0V	---	---	±10	uA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V , I _D =0.3A	---	2.2	3	Ω
		V _{GS} =4.5V , I _D =0.2A	---	2.3	4	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	2	2.5	V
g _{fs}	Forward Transconductance	V _{DS} =10V , I _D =0.1A	---	0.3	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =30V , V _{GS} =10V , I _D =0.1A	---	3.5	---	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	1.4	---	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	0.2	---	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =30V , V _{GS} =10V , R _G =6Ω I _D =0.1A	---	3.5	---	ns
T _r	Rise Time ^{2, 3}		---	5	---	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	21	---	
T _f	Fall Time ^{2, 3}		---	21	---	
C _{iss}	Input Capacitance	V _{DS} =30V , V _{GS} =0V , F=1MHz	---	15	---	pF
C _{oss}	Output Capacitance		---	2	---	
C _{rss}	Reverse Transfer Capacitance		---	1	---	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V , Force Current	---	---	300	mA
I _{SM}	Pulsed Source Current		---	---	600	mA
V _{SD}	Diode Forward Voltage	V _{GS} =0V , I _S =0.1A , T _J =25°C	---	---	1.3	V

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.

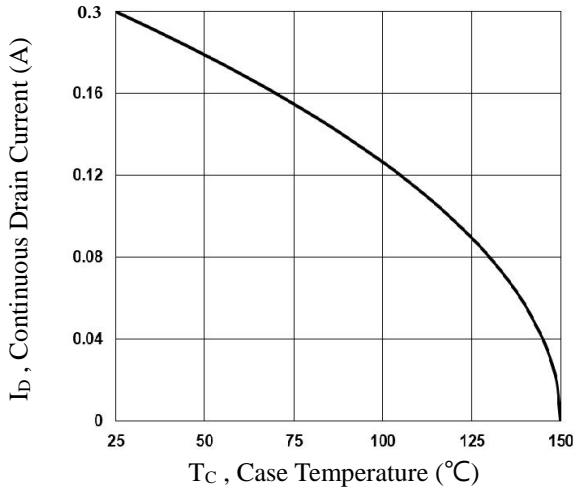


Fig.1 Continuous Drain Current vs. T_c

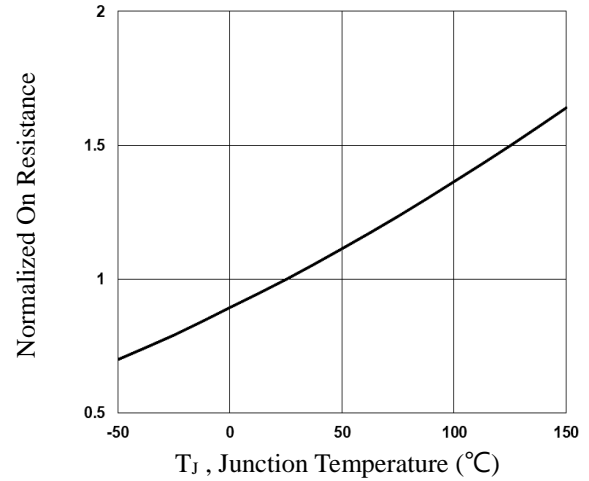


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

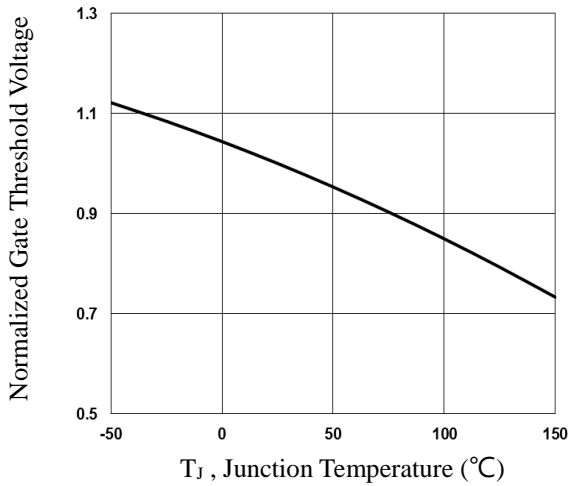


Fig.3 Normalized V_{th} vs. T_j

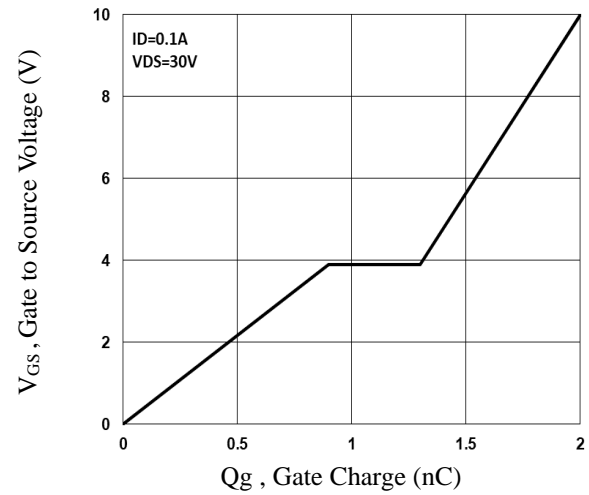


Fig.4 Gate Charge Waveform

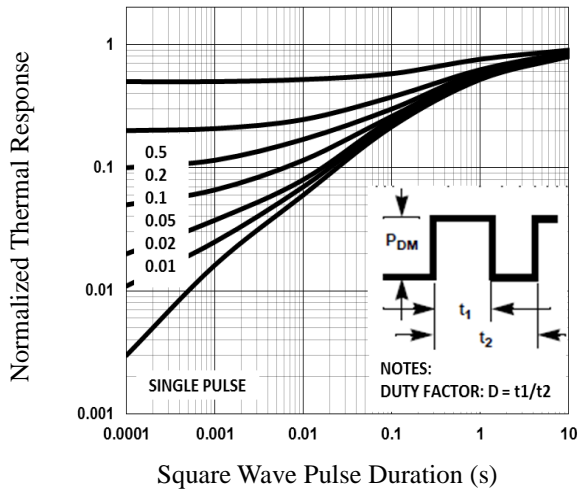


Fig.5 Normalized Transient Response

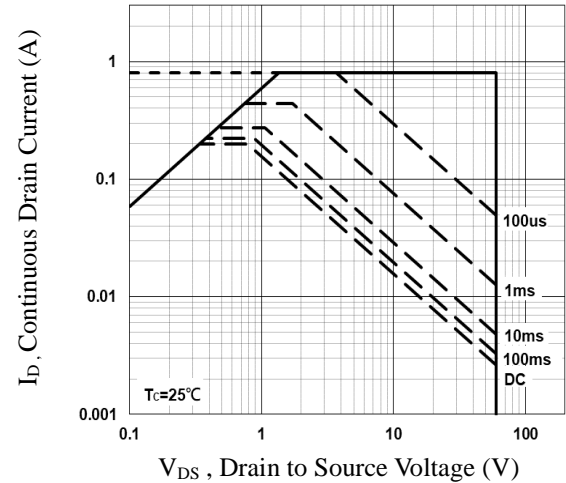


Fig.6 Maximum Safe Operation Area

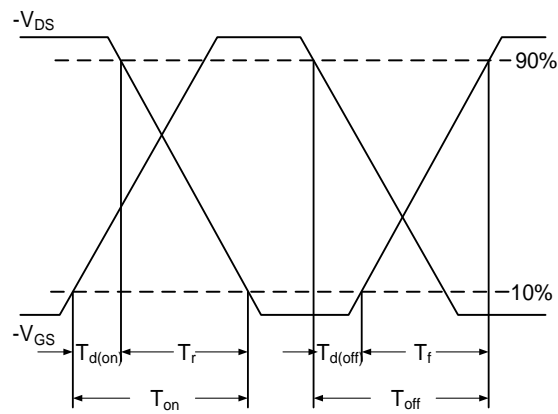


Fig.7 Switching Time Waveform

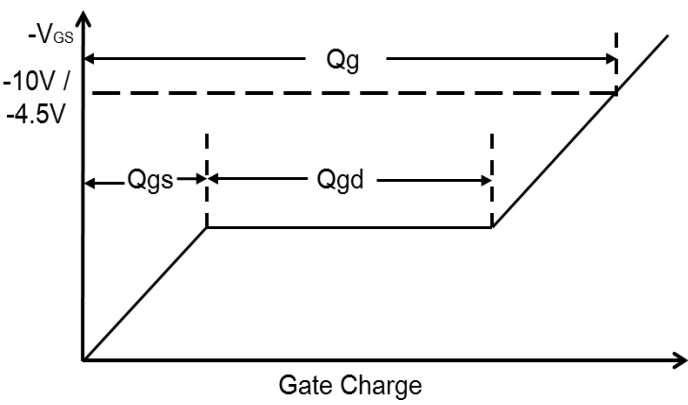
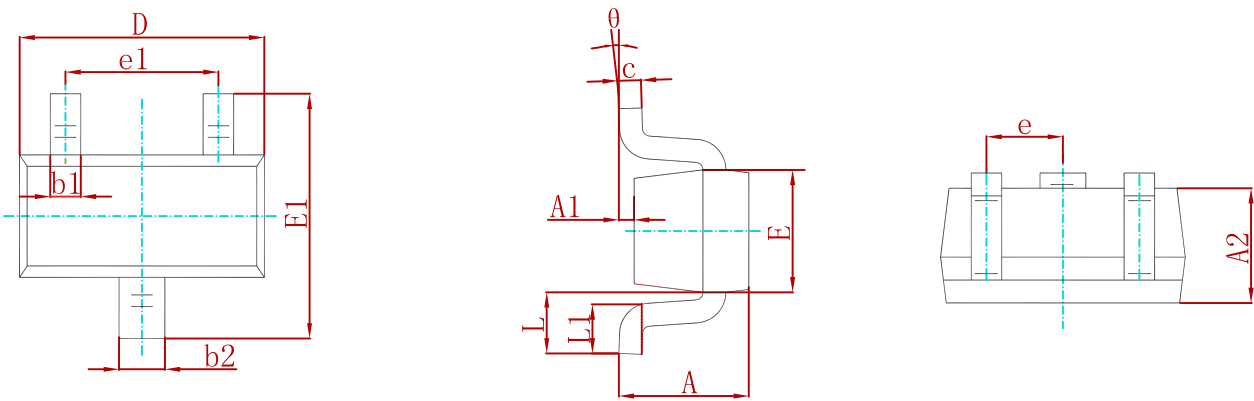


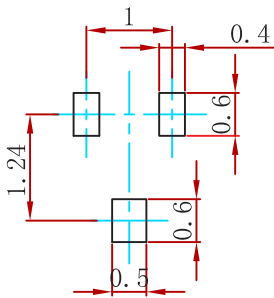
Fig.8 Gate Charge Waveform

PACKAGE MECHANICAL DATA



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Suggested Pad Layout



- Note:
- 1. Controlling dimension: in millimeters.
 - 2. General tolerance: $\pm 0.05\text{mm}$.
 - 3. The pad layout is for reference purposes only.

REEL SPECIFICATION

P/N	PKG	QTY
2N7002T-MS	SOT-523	3000

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