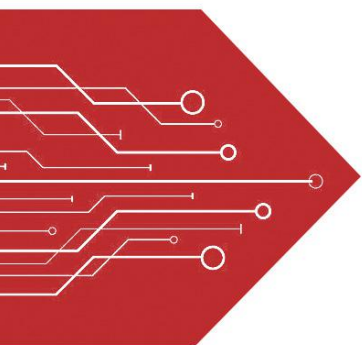


MSKSEMI

SEMICONDUCTOR



ESD



TVS



TSS



MOV



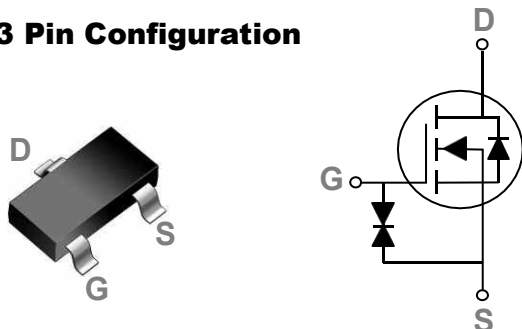
GDT



PLED

Product data sheet

SOT-23 Pin Configuration



BVDSS	RDS(ON)	ID
60V	2.2Ω	0.3A

Features

- 60V, 0.3A, $R_{DS(ON)} = 2.2\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available
- G-S ESD Protection Diode Embedded
- ESD protected up to 2KV

Applications

- Motor Drive
- Power Tools
- LED Lighting

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 ($T_c = 25^\circ\text{C}$)	0.3	A
	Drain Current – Continuous ($T_c = 100^\circ\text{C}$)	0.1	A
I_{DM}	Drain Current – Pulsed ¹	0.8	A
P_D	Power Dissipation ($T_c = 25^\circ\text{C}$)	0.35	W
	Power Dissipation – Derate above 25°C	0.003	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-50 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-50 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	357	$^\circ\text{C}/\text{W}$

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	2.8	Ω
		V _{GS} =4.5V , I _D =0.2A	---	2.4	3.0	Ω
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1	1.6	2.5	V
g _{fs}	Forward Transconductance	V _{DS} =10V , I _D =0.3A	---	0.5	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =30V , V _{GS} =10V , I _D =1A	---	3.7	5.6	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	0.9	1.4	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	0.4	0.6	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =30V , V _{GS} =10V , R _G =6Ω I _D =0.2A	---	3	6	ns
T _r	Rise Time ^{2, 3}		---	5	10	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	14	27	
T _f	Fall Time ^{2, 3}		---	9	17	
C _{iss}	Input Capacitance	V _{DS} =30V , V _{GS} =0V , F=1MHz	---	25.5	38	pF
C _{oss}	Output Capacitance		---	17	26	
C _{rss}	Reverse Transfer Capacitance		---	7.8	12	

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	---	---	0.3	A
I _{SM}	Pulsed Source Current		---	---	1.2	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1	V
t _{rr}	Reverse Recovery Time	V _{GS} =50V , I _S =1A , dI/dt=100A/μs	---	3.4	---	ns
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	0.7	---	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.

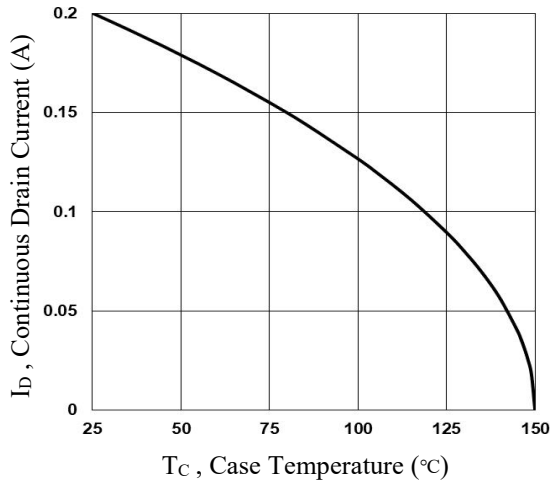


Fig.1 Continuous Drain Current vs. T_C

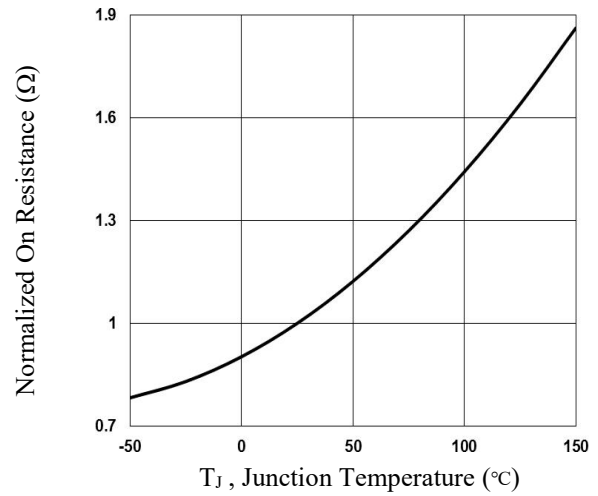


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

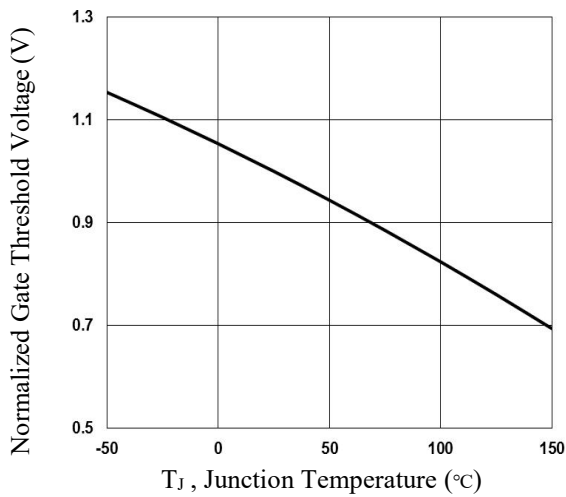


Fig.3 Normalized V_{th} vs. T_J

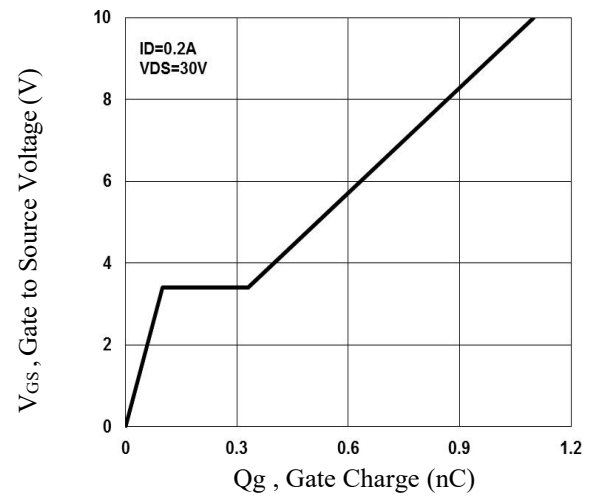


Fig.4 Gate Charge Waveform

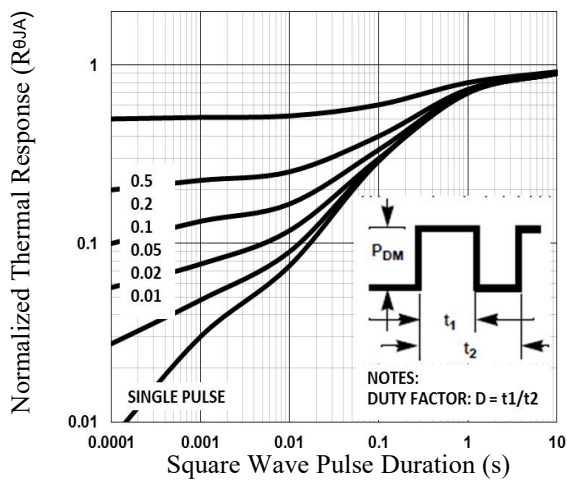


Fig.5 Normalized Transient Impedance

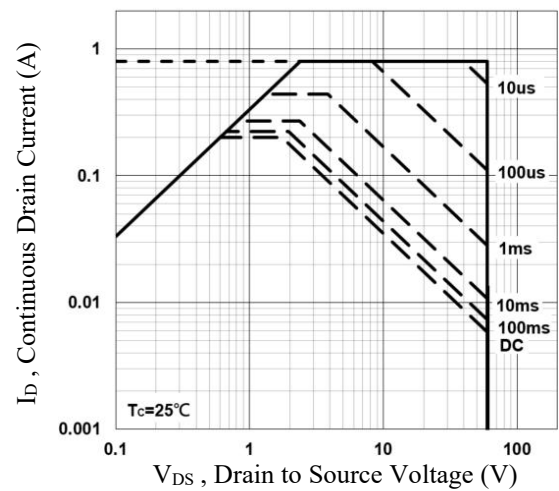
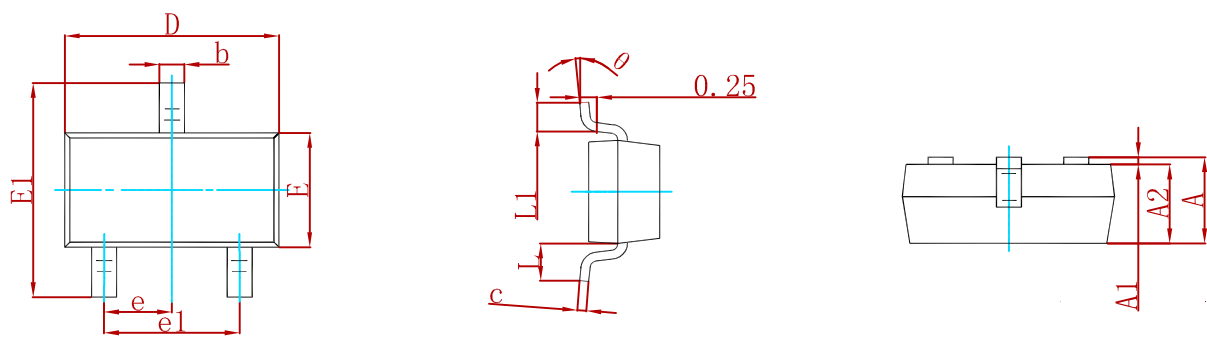


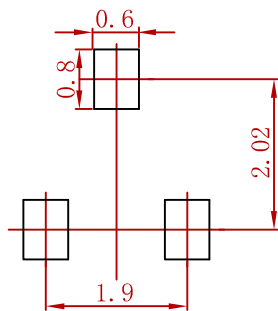
Fig.6 Maximum Safe Operation Area

PACKAGE MECHANICAL DATA



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°

Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

REEL SPECIFICATION

P/N	PKG	QTY
2N7002K	SOT-23	3000

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