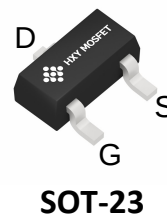




Description

The SQ2309ES-T1-GE3 is the high cell density
trenched P-ch MOSFETs, which provides excellent
RDS(ON) and efficiency for most of the small power
switching and load switch applications.
The SQ2309ES-T1-GE3 meet the RoHS and Green
Product requirement with full function reliability approved.

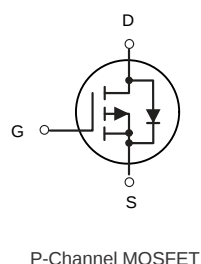


General Features

$V_{DS} = -60V, I_D = -2A$
 $R_{DS(ON)} < 200m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 300m\Omega @ V_{GS} = -4.5V$

Application

Load switch
PWM application



Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SQ2309ES-T1-GE3	SOT-23	HXY MOSFET	3000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current-Continuous	-2	A
I_{DM}	Drain Current-Pulsed (Note 1)	-5.2	A
P_D	Maximum Power Dissipation	1	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	°C
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 2)	83.3	°C/W



Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current($T_A=25^{\circ}\text{C}$)	$V_{DS}=-60V$, $V_{GS}=0V$	--	--	-1	μA
	Zero Gate Voltage Drain Current($T_A=125^{\circ}\text{C}$)	$V_{DS}=-60V$, $V_{GS}=0V$	--	--	-100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	--	--	± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu A$	-1.0	-1.5	-2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance②	$V_{GS}=-10V$, $I_D=-2A$	--	160	200	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance②	$V_{GS}=-4.5V$, $I_D=-1A$	--	200	300	m Ω
C_{iss}	Input Capacitance	$V_{DS}=-30V$, $V_{GS}=0V$, $f=1\text{MHz}$	--	310	--	pF
C_{oss}	Output Capacitance		--	22	--	pF
C_{rss}	Reverse Transfer Capacitance		--	15	--	pF
Q_g	Total Gate Charge	$V_{DS}=-30V$ $I_D=-2A$, $V_{GS}=-10V$	--	5.4	--	nC
Q_{gs}	Gate Source Charge		--	1.1	--	nC
Q_{gd}	Gate Drain Charge		--	1.6	--	nC
$t_{d(on)}$	Turn on Delay Time	$V_{DD}=-30V$, $I_D=-2A$, $R_G=3.3\Omega$, $V_{GS}=-10V$	--	41	--	ns
t_r	Turn on Rise Time		--	22	--	ns
$t_{d(off)}$	Turn Off Delay Time		-	25	--	ns
t_f	Turn Off Fall Time		--	32	--	ns
I_{SD}	Source drain current(Body Diode)	$T_A=25^{\circ}\text{C}$	--	--	-2.0	A
V_{SD}	Forward on voltage②	$T_j=25^{\circ}\text{C}$, $I_{SD}=-2A$, $V_{GS}=0V$	--	-0.84	-1.2	V

Notes:

① Pulse width limited by maximum allowable junction temperature

② Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.



Typical Electrical and Thermal Characteristics (Curves)

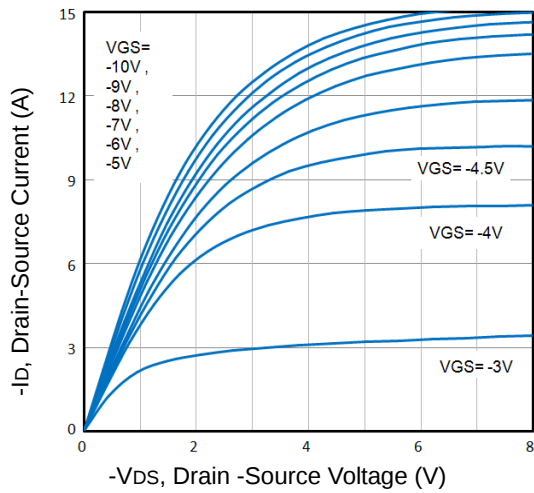


Fig1. Typical Output Characteristics

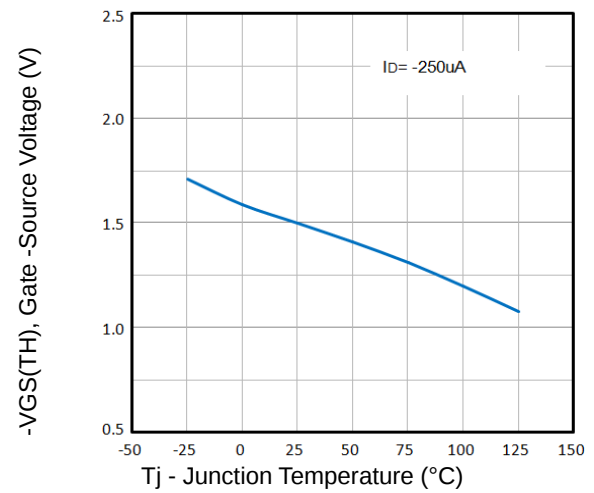


Fig2. Normalized Threshold Voltage Vs. Temperature

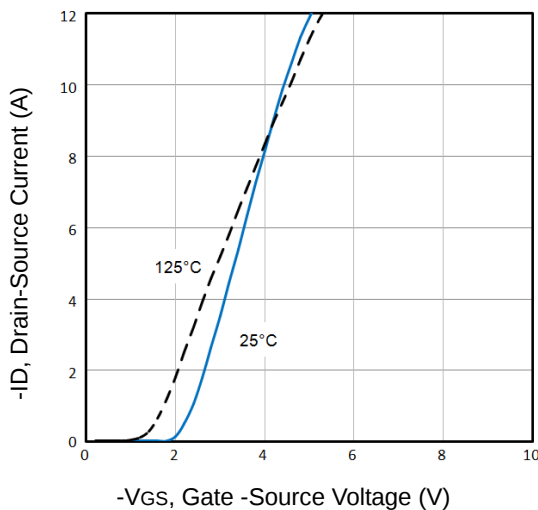


Fig3. Typical Transfer Characteristics

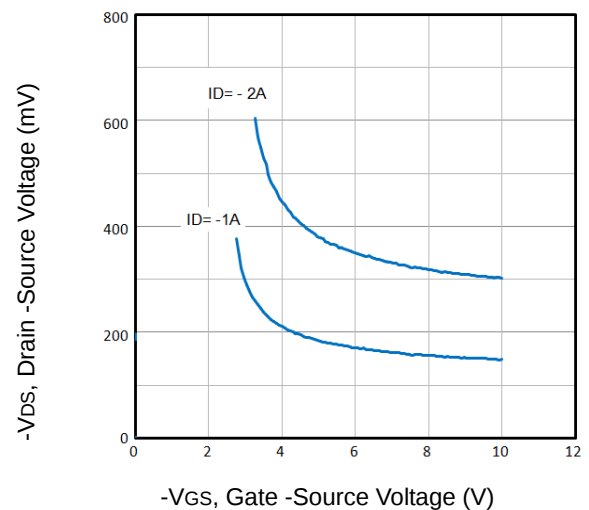


Fig4. Drain-Source Voltage vs Gate-Source Voltage

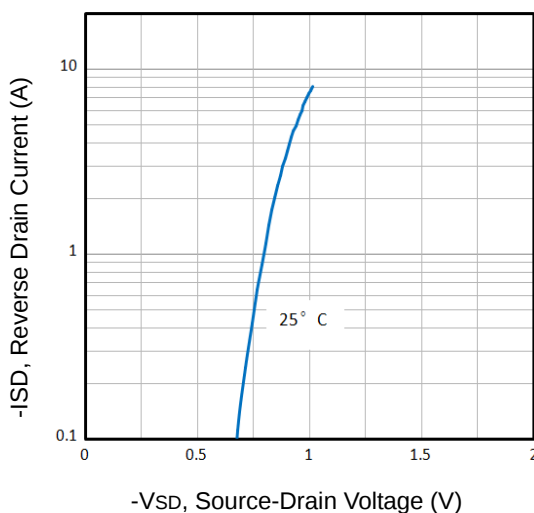


Fig5. Typical Source-Drain Diode Forward Voltage

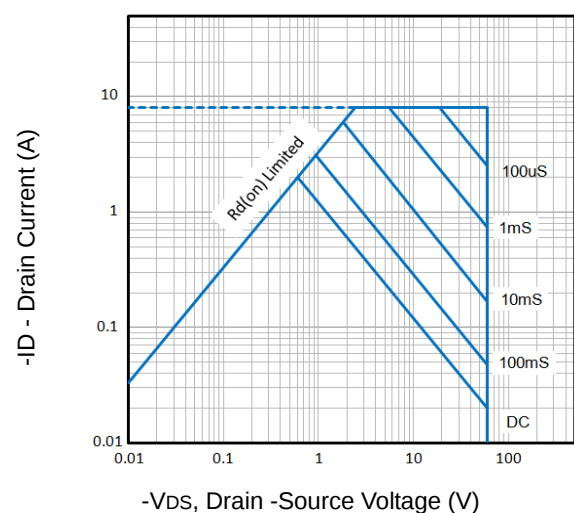


Fig6. Maximum Safe Operating Area

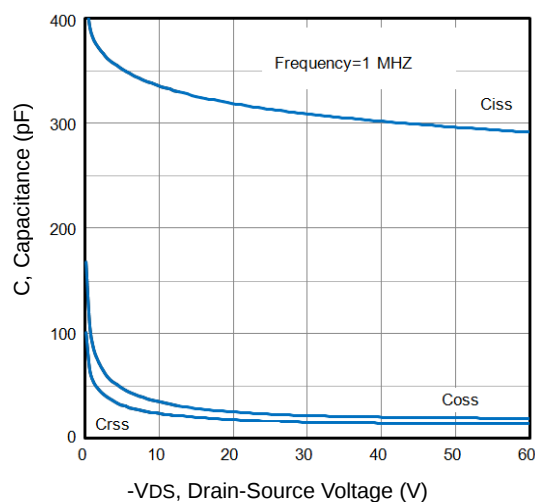


Fig7. Typical Capacitance Vs. Drain-Source Voltage

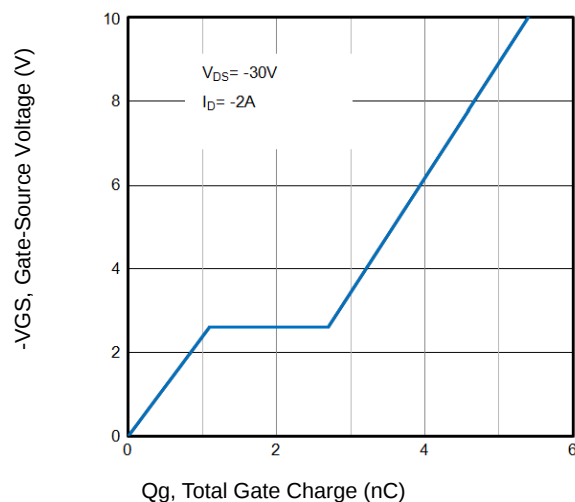


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

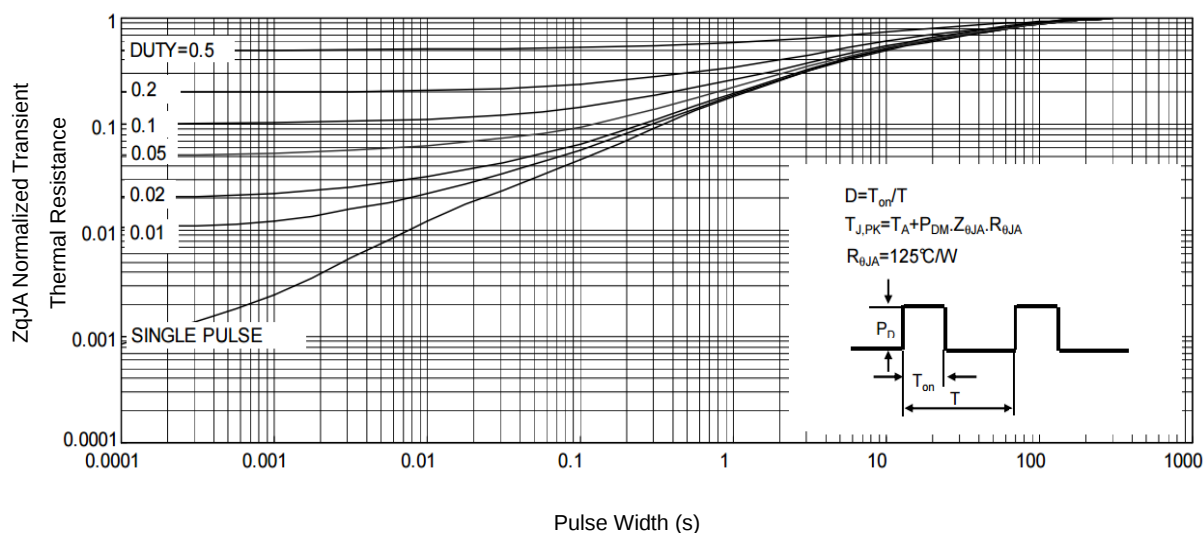


Fig9. Normalized Maximum Transient Thermal Impedance

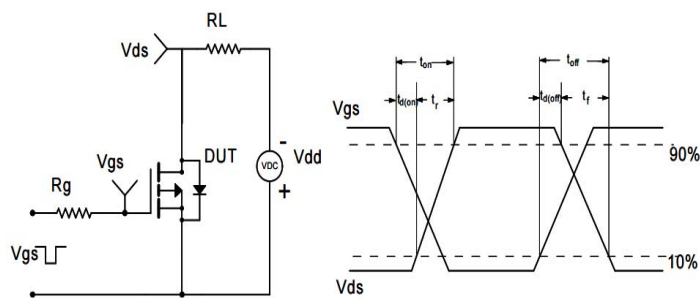
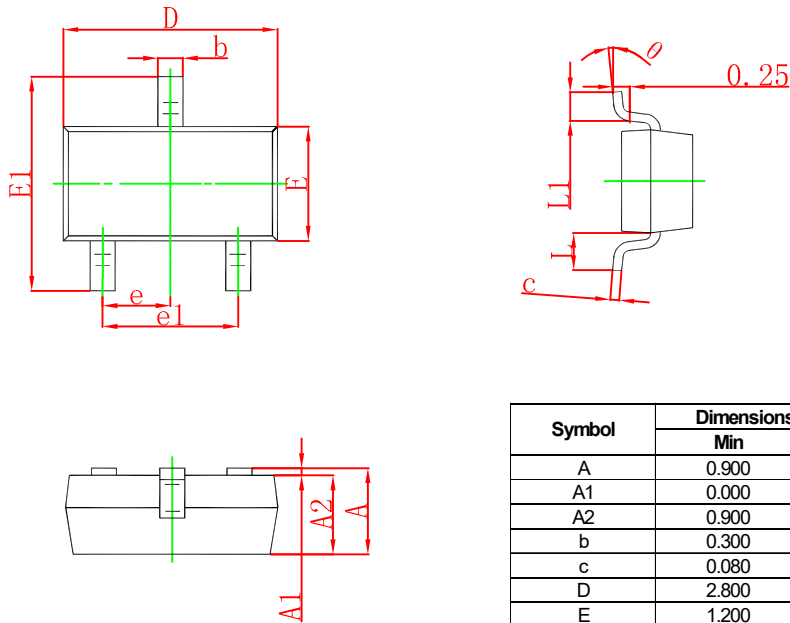


Fig10. Switching Time Test Circuit and waveforms

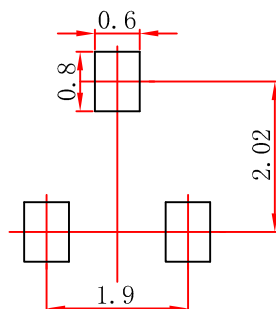


SOT-23 Package Outline Dimensions



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: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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