

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

Product Summary



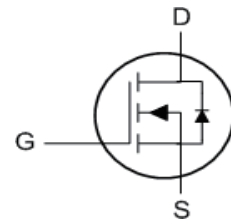
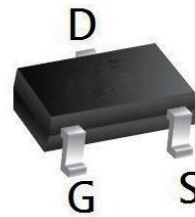
BVDSS	RDSON	ID
-60V	160mΩ	-2.0A

Description

The 2309 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and efficiency for most of the small power switching and load switch applications.

The 2309 meet the RoHS and Green Product requirement with full function reliability approved.

SOT23 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V _{GS}	Gate-Source voltage	±20	V
I _D	Continuous Drain Current	-2	A
I _{DM}	Pulsed Drain Current ₁	-5.2	A
P _D	Power Dissipation	1	W
T _J	Junction Temperature	150	°C
T _{STG}	Storage Temperature	-55~ 150	°C
R _{θJA}	Thermal Resistance from Junction to Ambient ₂	125	°C/W

Electrical Characteristics (T_J =25 °C unless otherwise specified)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-60	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current(T _A =25°C)	V _{DS} =-60V, V _{GS} =0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(T _A =125°C)	V _{DS} =-60V, V _{GS} =0V	--	--	-100	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1	-1.5	-2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =-10V, I _D =-2A	--	160	200	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =-4.5V, I _D =-1A	--	200	300	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{iSS}	Input Capacitance	V _{DS} =-30V, V _{GS} =0V, f=1MHz	--	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
Switching Characteristics						
t _{d(on)}	Turn on Delay Time	V _{DD} =-30V, I _D =-2A, R _G =3.3Ω, 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
Source Drain Diode Characteristics						
I _{SD}	Source drain current(Body Diode)	T _A =25°C	--	--	-2	A
V _{SD}	Forward on voltage②	T _J =25°C, I _{SD} =-2A, V _{GS} =0V	--	-0.84	-1.2	V

Note :

- 1.Pulse width limited by maximum allowable junction temperature.
- 2.Pulse Test: Pulse width ≤300μs, duty cycle ≤2%.

Typical Performance Characteristics

Figure 1: Output Characteristics

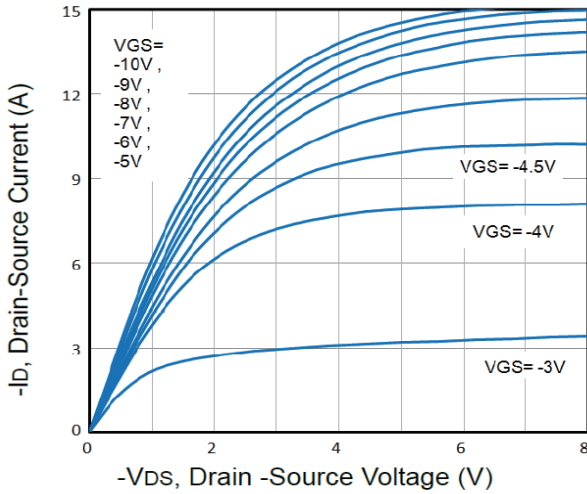


Figure 2: Normalized Threshold Voltage

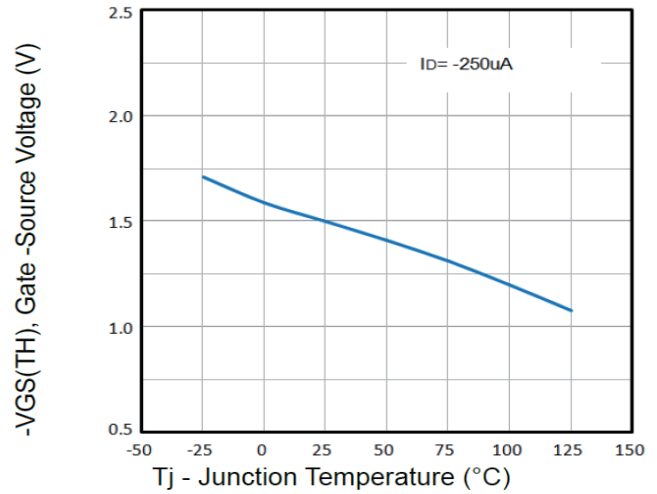


Figure 3: Typical Transfer Characteristics

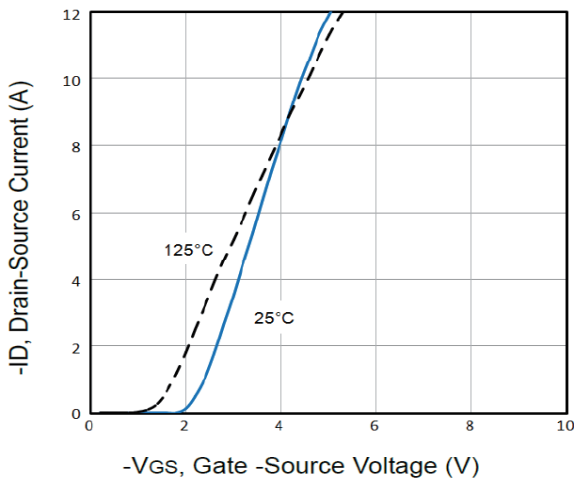


Figure 4: Drain-Source Voltage vs Gate-Source Voltage

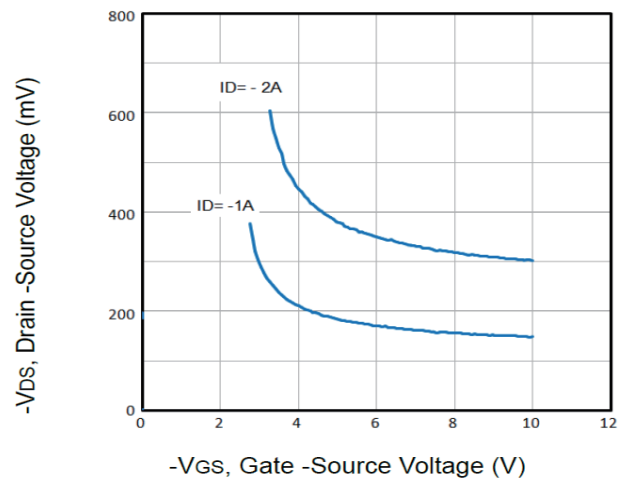


Figure 5: Typical Source-Drain Diode Forward Characteristics

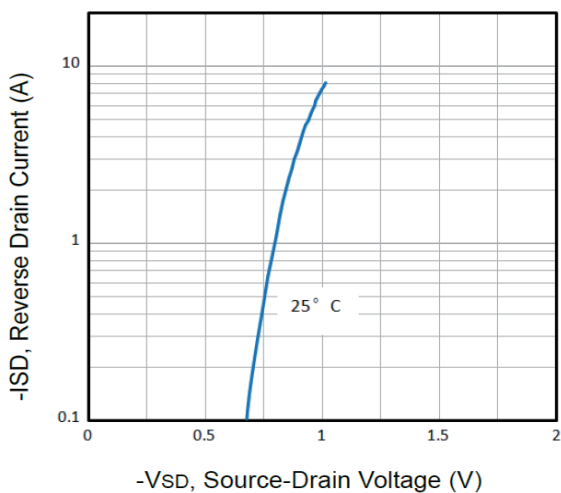
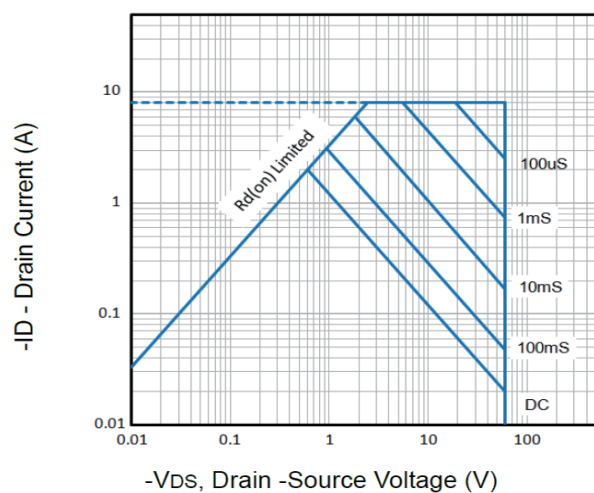


Figure 6: Maximum Safe Operating Area



Typical Performance Characteristics

Figure 7: Typical Capacitance Vs. Drain-Source Voltage

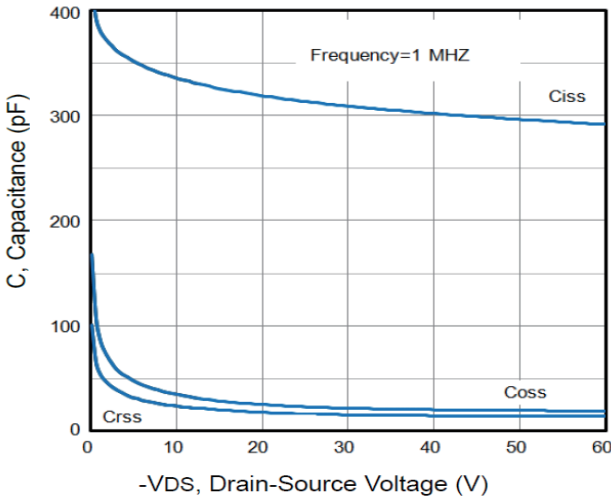


Figure 8: Typical Gate Charge Vs. Gate-Source Voltage

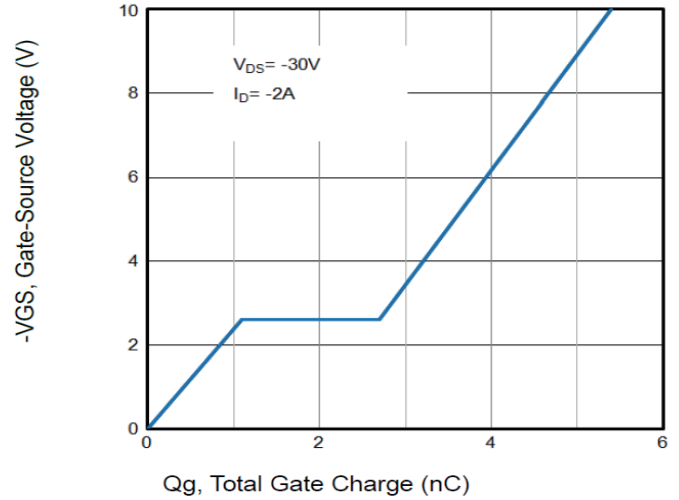


Figure 9: Normalized Maximum Transient Thermal Impedance

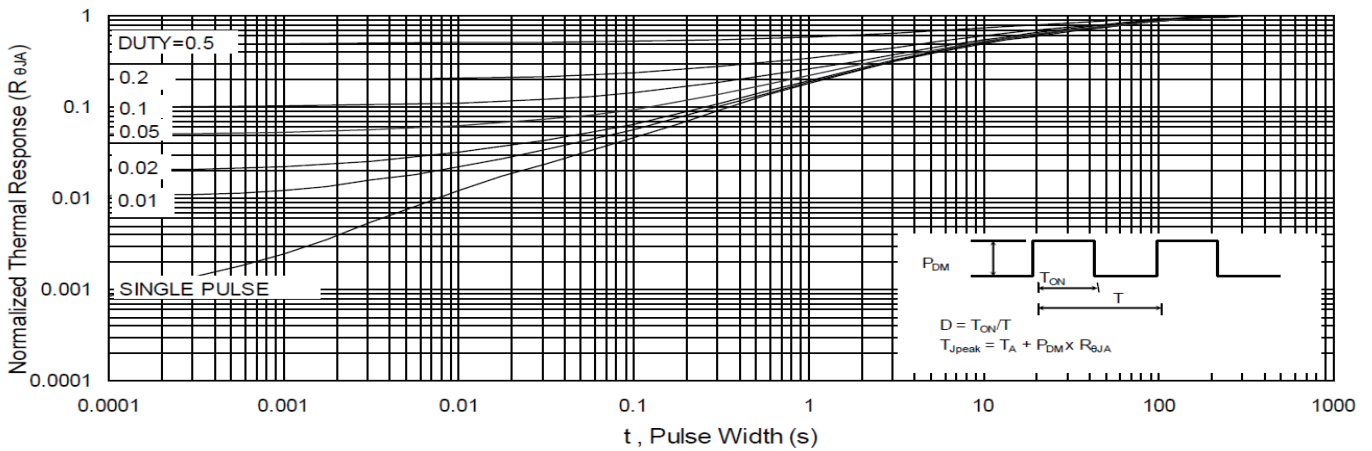
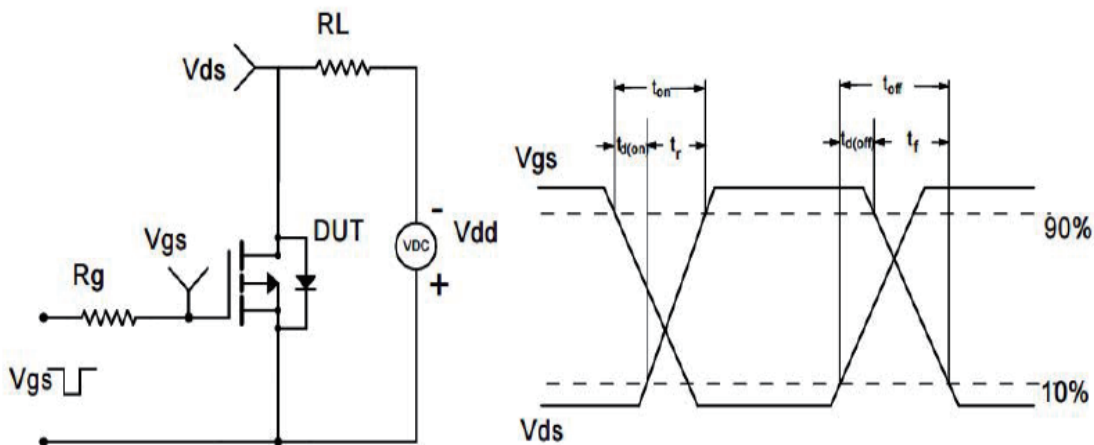
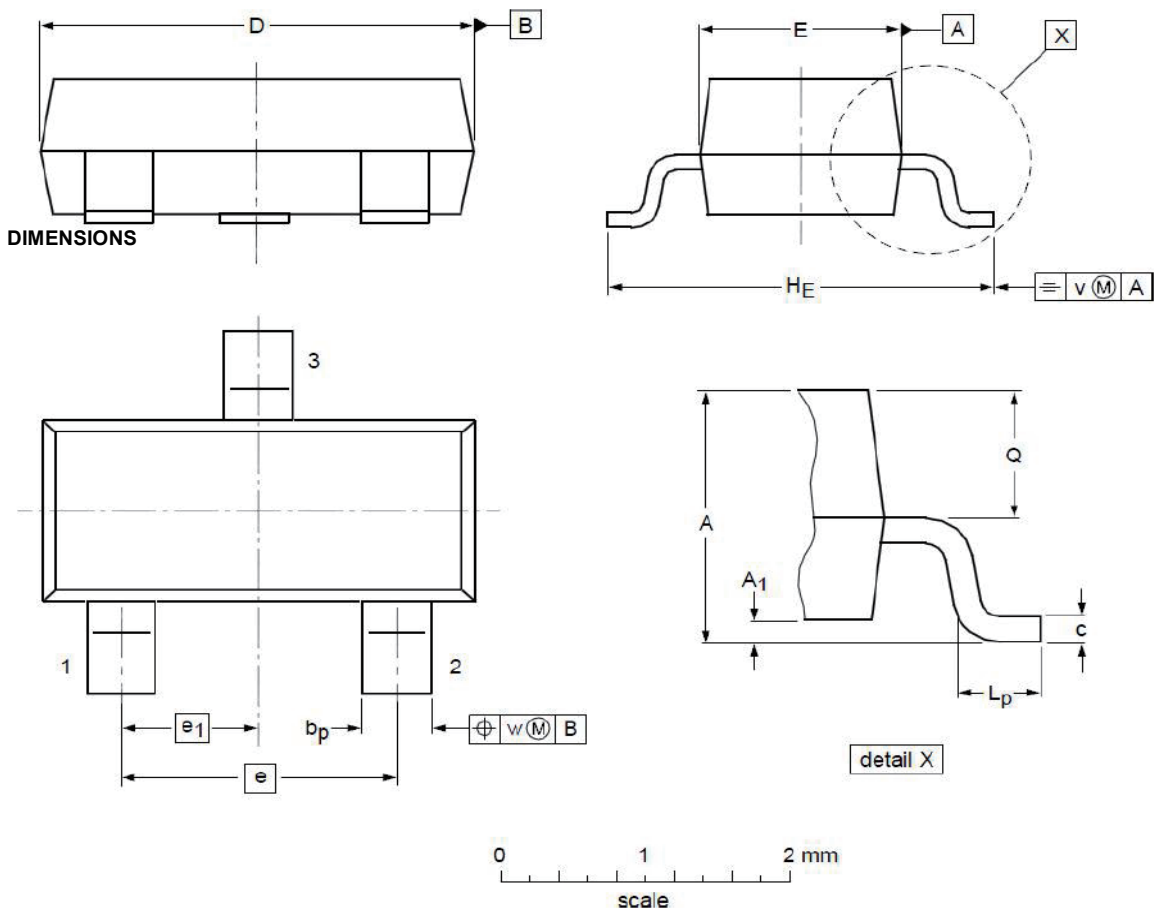


Figure 10: Switching Time Test Circuit and Waveform



SOT23 Mechanical tData



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.9	1.01	1.15	A ₁	0.01	0.05	0.1
b _p	0.3	0.42	0.5	c	0.08	0.13	0.15
D	2.8	2.92	3	E	1.2	1.33	1.4
e	--	1.9	--	e ₁	--	0.95	--
He	2.25	2.4	2.55	L _p	0.3	0.42	0.5
Q	0.45	0.49	0.55	v	--	0.2	--
w	--	0.1	--				

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