MS23P09

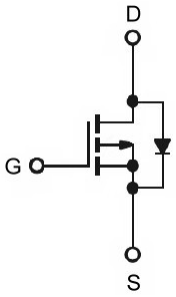
P-Channel 20-V (D-S) MOSFET

Description

The MS23P09 is using trench DMOS technology. This advanced technology has been especially tailored to minimize $R_{DS(ON)}$, provide superior switching performance and commutation mode. These devices are well suited for high efficiency fast switching applications.

The device meets the RoHS and Green Product requirement with full function reliability approved.

Graphic Symbol



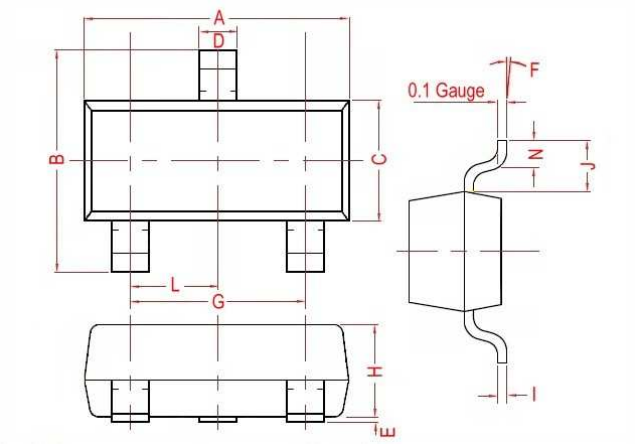
Features

- Advanced DMOS Trench Technology
- Suit for -1.8V Gate Drive Applications
- Improve dv/dt Capability
- Fast Switching
- Green Device Available

Typical Applications

- Battery Protection
- Load Switch
- Hand-held Instrument

Package Dimension



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	1.90 Ref.	
B	2.30	3.00	H	0.90	1.30
C	1.20	1.75	I	0.05	0.21
D	0.30	0.50	J	0.58 Ref.	
E	0.01	0.15	L	0.95 Typ.	
F	0°	10°	N	0.20 Min.	

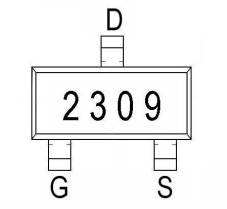
Package type：SOT-23

Packing & Order Information

3,000/Reel

RoHS Compliant

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (unless otherwise specified)			
Symbol	**Parameter**	**Value**	**Units**
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	±10	V
I_D	Continuous Drain Current (T_C=25°C)	-5.8	A
	Continuous Drain Current (T_C=100°C)	-3.7	A
I_{DM}	Pulsed Drain Current[1,2] (T_C=25°C)	-23	A
P_D	Power Dissipation (T_C=25°C)	1.56	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	°C

Thermal Resistance Ratings			
Symbol	**Parameter**	**Maximum**	**Units**
$R_{\theta JA}$	Maximum Junction-to-Ambient[3]	80	°C/W

Electrical Characteristics(T_J=25°C unless otherwise specified)						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
$V_{GS\ (th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-0.3	-0.6	-1.0	V
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	-20	-	-	V
g_{fs}	Forward Transconductance	V_{DS}=-10V, I_D=-3A	-	8.4	-	S
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V, V_{GS}=±10V	-	-	±100	nA
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V, V_{GS}=0V, T_J=25°C V_{DS}=-16V, V_{GS}=0V, T_J=125°C	-	-	-1 -10	μA
$R_{DS\ (on)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-4.5V, I_D=-4A V_{GS}=-2.5V, I_D=-3A V_{GS}=-1.8V, I_D=-2A	- - -	28 37 49	33 45 65	mΩ
V_{SD}	Diode Forward Voltage[2]	I_S=-1A, V_{GS}=0V, T_J=25°C	-	-	-1.0	V
I_S	Continuous Source Current **(Diode)**	V_G=V_D=0V, Force Current	-	-	-5.8	A
I_{SM}	Pulsed Source Current **(Diode)**		-	-	-11.6	

Notes

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.

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Dynamic and switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge[2,3]	V_{DS} =-10V I_D =-4A V_{GS} =-4.5V	--	16.1	--	nC
Q_{gs}	Gate-Source Charge		--	1.8	--	
Q_{gd}	Gate-Drain Charge		--	3.8	--	
$t_{d(on)}$	Turn-On Delay Time[2,3]	V_{DS} =-10V I_D =-1A V_{GS} =-4.5V R_G =25Ω	--	8.2	--	ns
t_r	Rise Time		--	30	--	
$t_{d(off)}$	Turn-Off Delay Time		--	71.1	--	
t_f	Fall Time		--	19.8	--	
C_{ISS}	Input Capacitance	V_{DS} =-15V V_{GS} =0V f =1.0MHz	--	1440	--	pF
C_{OSS}	Output Capacitance		--	155	--	
C_{RSS}	Reverse Transfer Capacitance		--	115	--	

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- **Typical Electrical Characteristics**

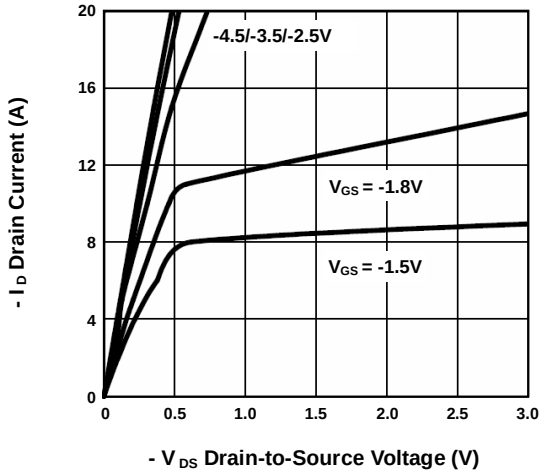

FIG.1-Typical Output Characteristics

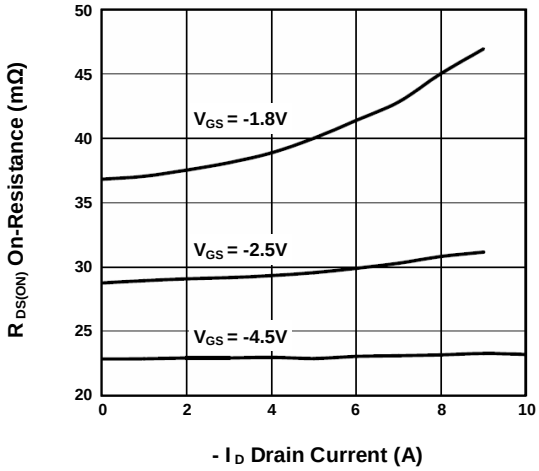

FIG.2-On-Resistance vs. Drain Current

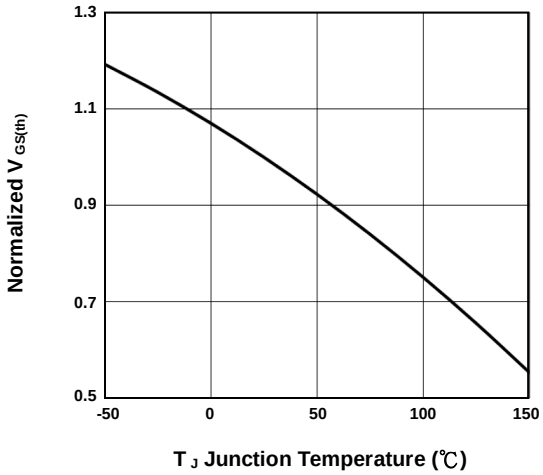

FIG.3-Normalized $V_{GS(th)}$ vs. T_J

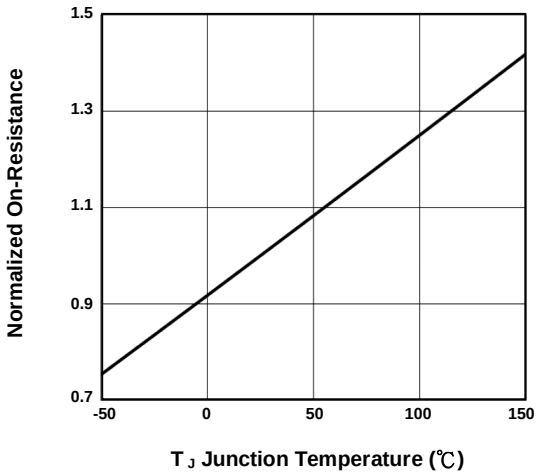

FIG.4-Normalized R_{DSON} vs. T_J

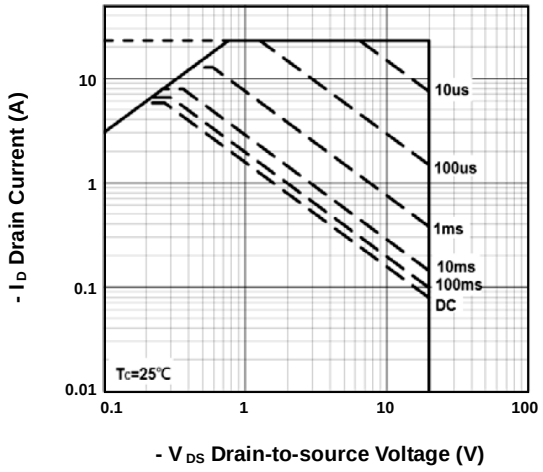

FIG.5-Safe Operating Area

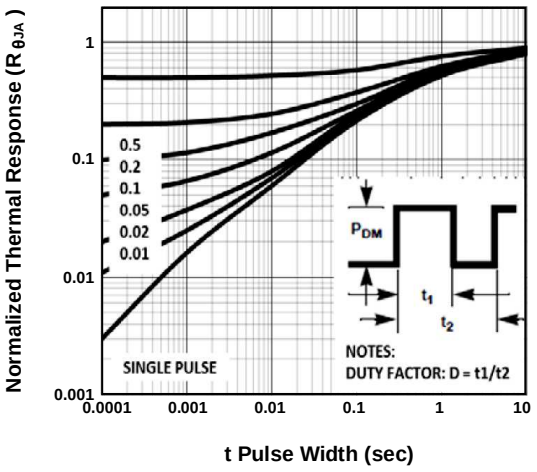

FIG.6-Transient Thermal Impedance

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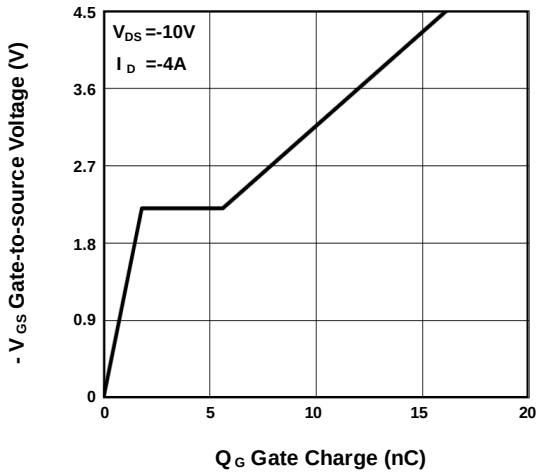

FIG.7-Gate Charge Characteristics

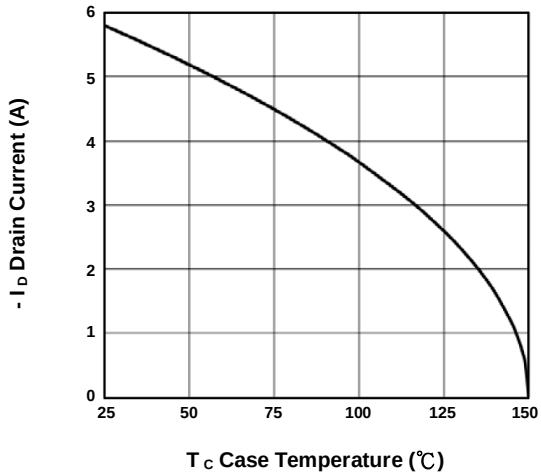

FIG.8-Drain Current vs. T_C

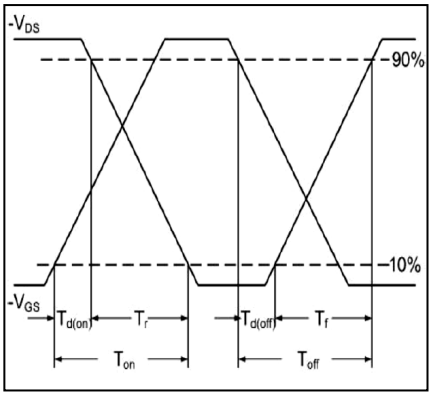

FIG.9-Switching Time Waveform

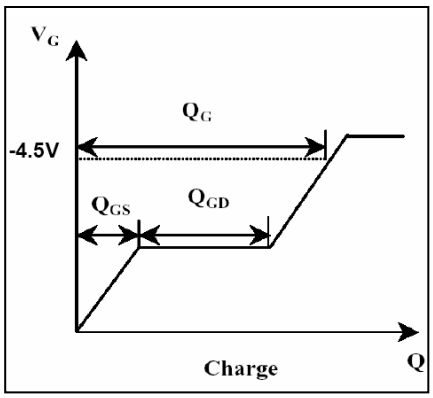

FIG.10-Gate Charge Waveform

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