

General Description

These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

Features

-20V, -5.0A, $R_{DS(ON)} = 30m\Omega @ V_{GS} = -4.5V$

Improved dv/dt capability

Fast switching

Green Device Available

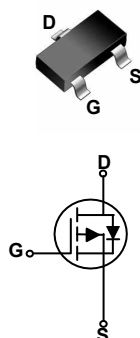
Applications

Notebook

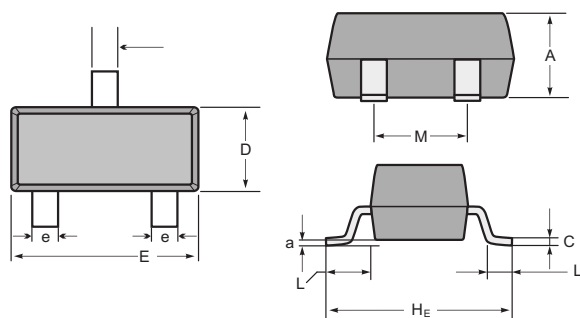
Load Switch

Battery Protection

Hand-held Instruments



BVDSS	RDSON	ID
-20V	30mΩ	-5.0A



SOT-23 mechanical data

UNIT		A	C	D	E	HE	e	M	L	L1	a
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)	0.0
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7			0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)	0.0
	min	35	3	47	110	87	12	67			6

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	-5.0	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	-3.7	A
I_{DM}	Drain Current – Pulsed ¹	-20	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	1.56	W
	Power Dissipation – Derate above 25°C	0.012	W/ $^\circ\text{C}$
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	---	80	$^\circ\text{C}/\text{W}$

SI2323DS

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

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	---	-0.02	---	V/ $^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-20V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	-1	μA
		$V_{DS}=-16V$, $V_{GS}=0V$, $T_J=125^{\circ}\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V$, $I_D=-4A$	---	29	39	m Ω
		$V_{GS}=-2.5V$, $I_D=-3A$	---	40	50	
$V_{GS(th)}$	Gate Threshold Voltage		-0.4	-0.6	-1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	$V_{GS}=V_{DS}$, $I_D=-250\mu A$	---	2	---	mV/ $^{\circ}\text{C}$
gfs	Forward Transconductance	$V_{DS}=-10V$, $I_S=-3A$	---	8.4	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=-10V$, $V_{GS}=-4.5V$, $I_D=-4A$	---	16.1	---	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	1.8	---	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	3.8	---	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DD}=-10V$, $V_{GS}=-4.5V$, $R_G=25\Omega$ $I_D=-1A$	---	8.2	---	nS
T_r	Rise Time ^{2, 3}		---	30	---	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	71.1	---	
T_f	Fall Time ^{2, 3}		---	19.8	---	
C_{iss}	Input Capacitance	$V_{DS}=-15V$, $V_{GS}=0V$, $F=1\text{MHz}$	---	1440	---	pF
C_{oss}	Output Capacitance		---	155	---	
C_{rss}	Reverse Transfer Capacitance		---	115	---	

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	---	---	-5.0	A
I_{SM}	Pulsed Source Current		---	---	-10	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=-1A$, $T_J=25^{\circ}\text{C}$	---	---	-1.2	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

RATING AND CHARACTERISTIC CURVES (SI2323DS)

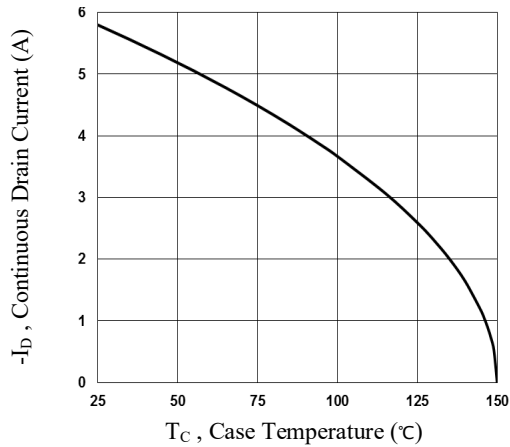


Fig.1 Continuous Drain Current vs. T_C

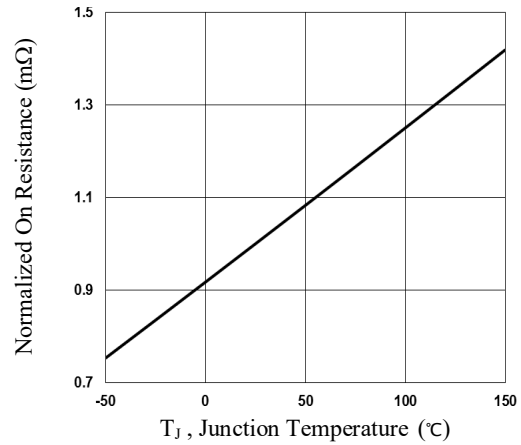


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

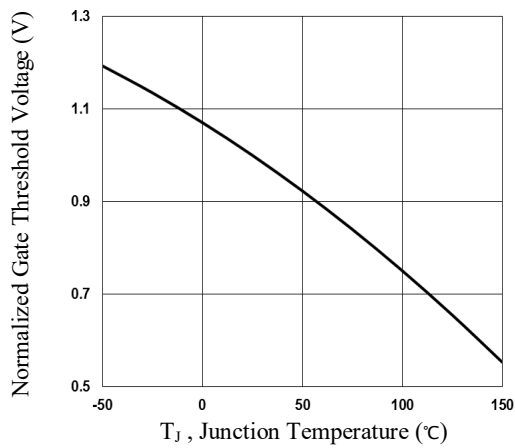


Fig.3 Normalized V_{th} vs. T_J

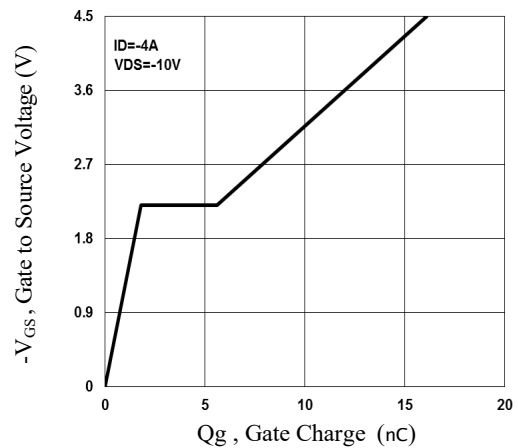


Fig.4 Gate Charge Waveform

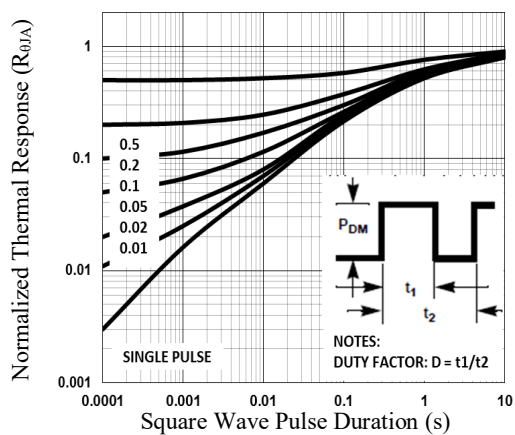


Fig.5 Normalized Transient Impedance

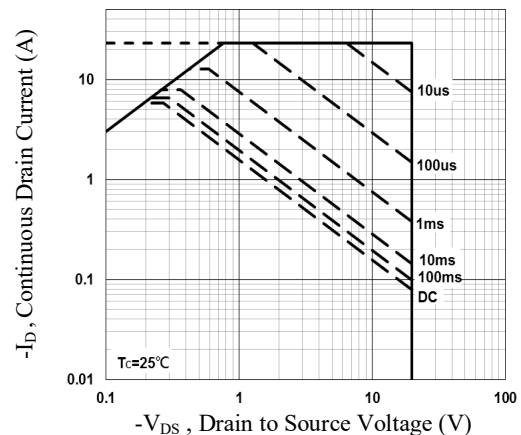


Fig.6 Maximum Safe Operation Area

RATING AND CHARACTERISTIC CURVES (SI2323DS)

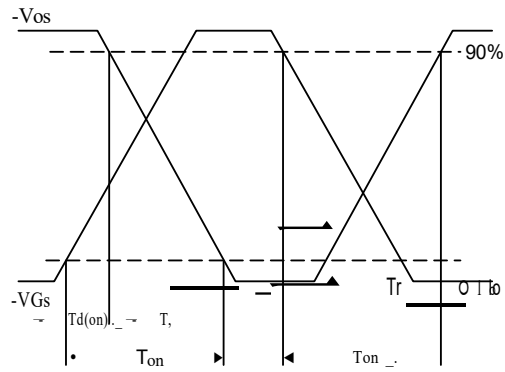


Fig.7 Switching Time Waveform

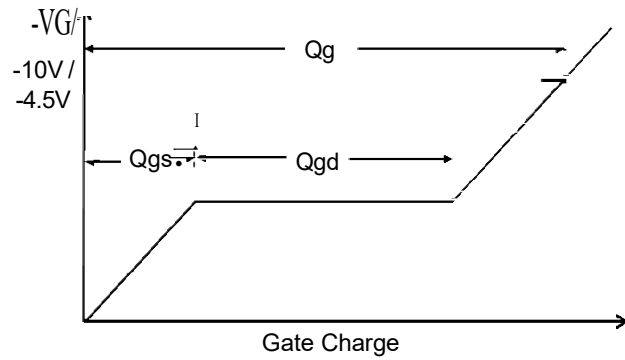


Fig.8 Gate Charge Waveform