

General Description

These N-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

30V, 3.5A, $R_{DS(ON)}=30m\Omega@V_{GS}=10V$

Improved dv/dt capability

Fast switching

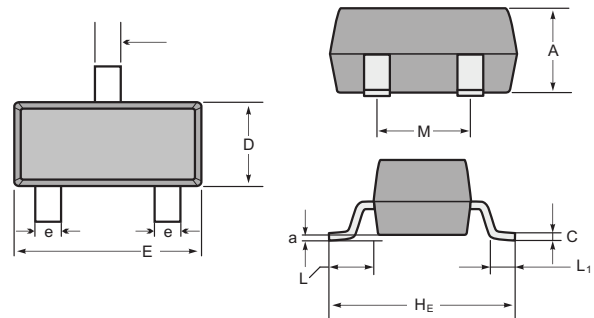
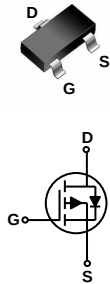
Green Device Available

Applications

MB / VGA / Vcore

Load Switch

Hand-Held Instrument



SOT-23 mechanical data

UNIT		A	C	D	E	H _E	e	M	L	L ₁	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

BVDSS	RDSON	ID
30V	30mΩ	3.5A

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_A=25^\circ\text{C}$)	3.5	A
	Drain Current – Continuous ($T_A=70^\circ\text{C}$)	1.68	A
I_{DM}	Drain Current – Pulsed ¹	12	A
P_D	Power Dissipation ($T_A=25^\circ\text{C}$)	278	mW
	Power Dissipation – Derate above 25°C	2.22	mW/ $^\circ\text{C}$
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	---	450	$^\circ\text{C/W}$

SI2304DDS

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	30	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.018	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =30V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =24V , V _{GS} =0V , T _J =125°C	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V , V _{DS} =0V	---	---	±100	nA

On Characteristics

R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V , I _D =2.5A	---	30	40	mΩ
		V _{GS} =4.5V , I _D =2A	---	45	66	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1	1.5	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-3.2	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =10V , I _D =2A	---	2.3	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =24V , V _{GS} =10V , I _D =1A	---	3.1	---	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	0.1	---	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	1.7	---	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =24V , V _{GS} =10V , R _G =3.3Ω I _D =1A	---	2.2	---	ns
T _r	Rise Time ^{2, 3}		---	6.9	---	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	15.2	---	
T _f	Fall Time ^{2, 3}		---	4.5	---	
C _{iss}	Input Capacitance	V _{DS} =25V , V _{GS} =0V , F=1MHz	---	245	---	pF
C _{oss}	Output Capacitance		---	40	---	
C _{rss}	Reverse Transfer Capacitance		---	78	---	
R _g	Gate resistance	V _{GS} =0V , V _{DS} =0V , F=1MHz	---	0.9	---	Ω

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	---	---	3.5	A
I _{SM}	Pulsed Source Current		---	---	7.0	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1.3	V

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.

RATING AND CHARACTERISTIC CURVES (SI2304DDS)

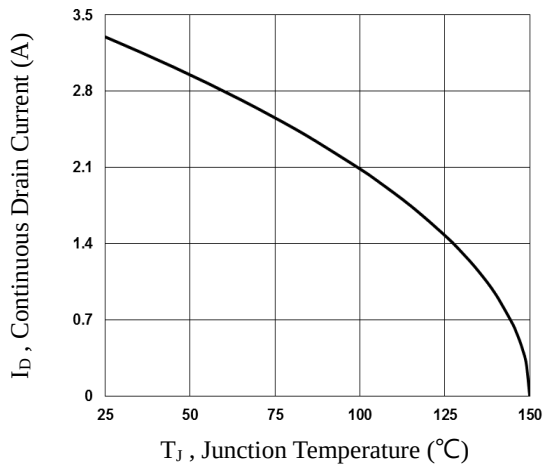


Fig.1 Continuous Drain Current vs. T_J

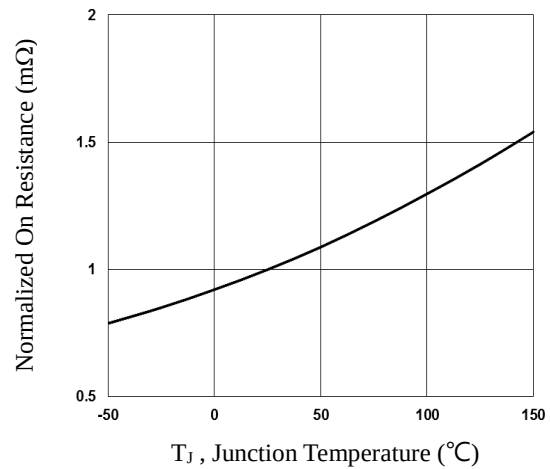


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

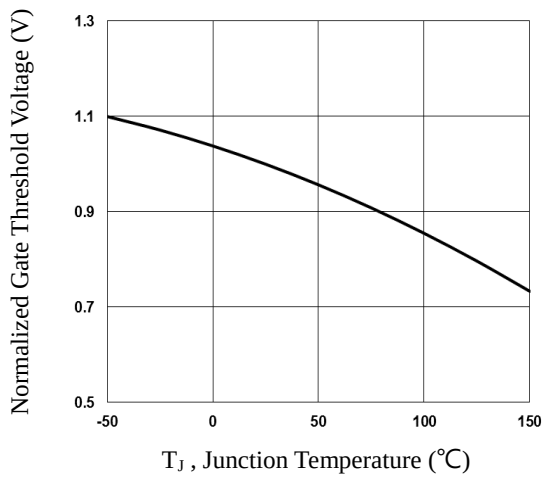


Fig.3 Normalized V_{th} vs. T_J

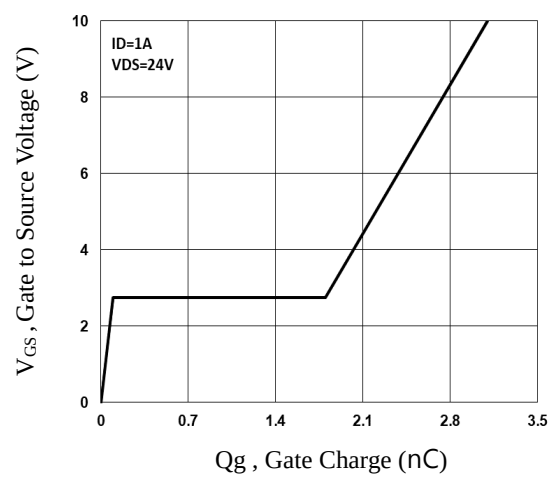


Fig.4 Gate Charge Waveform

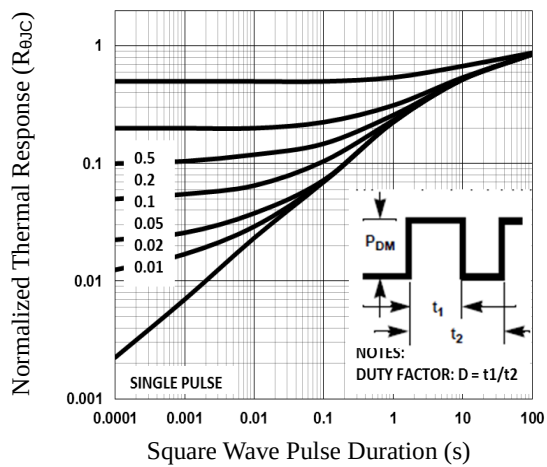


Fig.5 Normalized Transient Impedance

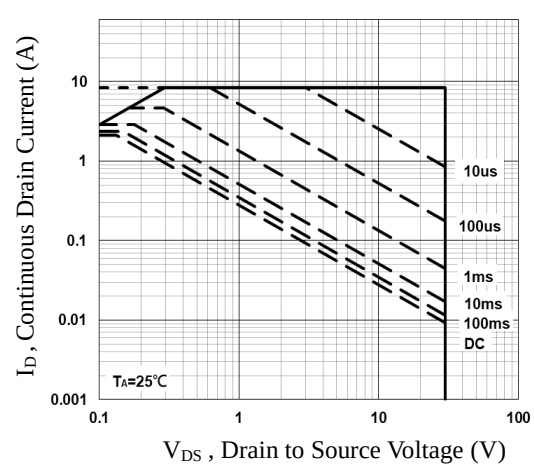


Fig.6 Maximum Safe Operation Area

RATING AND CHARACTERISTIC CURVES (SI2304DDS)

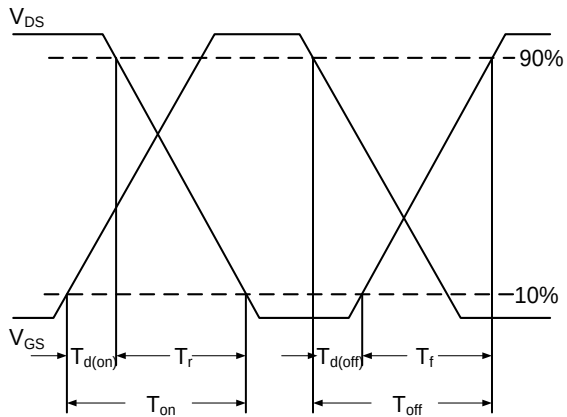


Fig.7 Switching Time Waveform

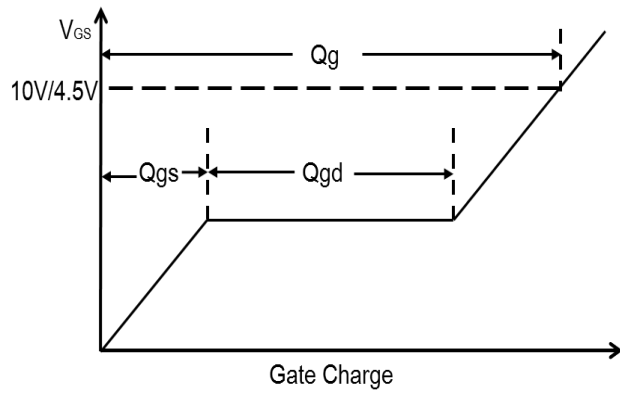


Fig.8 Gate Charge Waveform