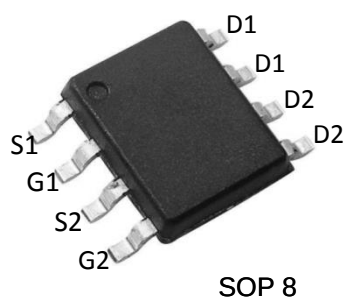


General Description

These N+P dual 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.



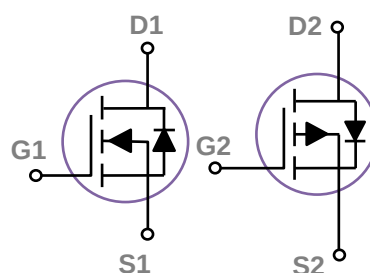
SOP 8

Features

- ◆ Fast switching
- ◆ Green Device Available
- ◆ Suit for 4.5V Gate Drive Applications

Applications

- ◆ DC Fan
- ◆ Motor Drive Applications
- ◆ Networking
- ◆ Half / Full Bridge Topology



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

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	5.0	-3.5	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	2.85	-2.21	A
I_{DM}	Drain Current – Pulsed ¹	18	-14	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	3.57		W
	Power Dissipation – Derate above 25°C	0.028		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	---	75	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	35	$^\circ\text{C/W}$

N-CH Electrical Characteristics (T_J=25 °C, unless otherwise)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	60	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.05	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =60V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =48V, 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

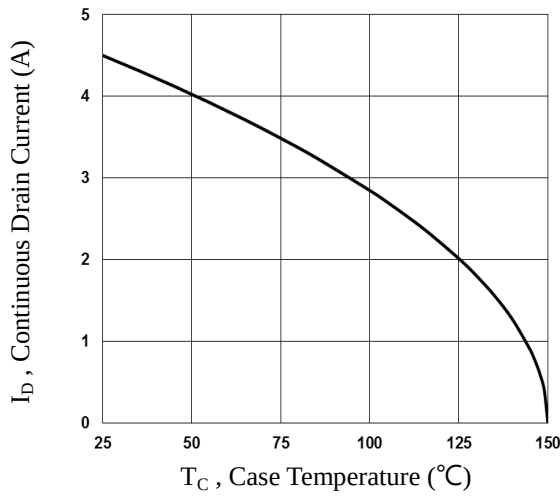
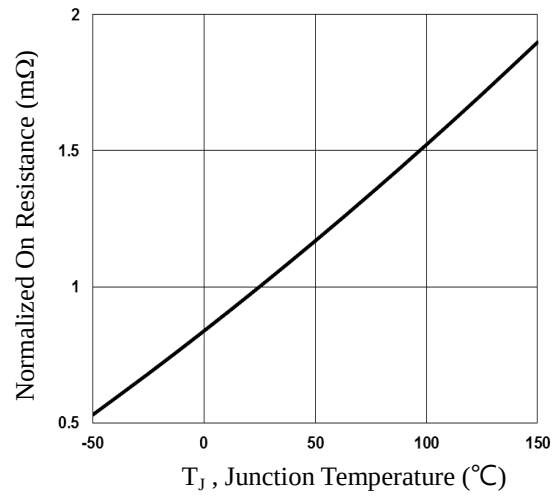
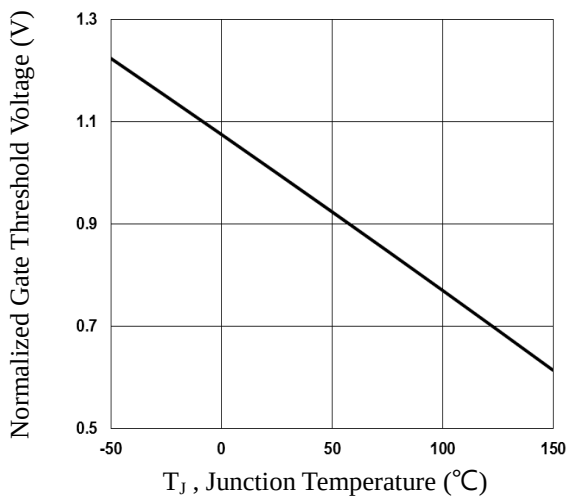
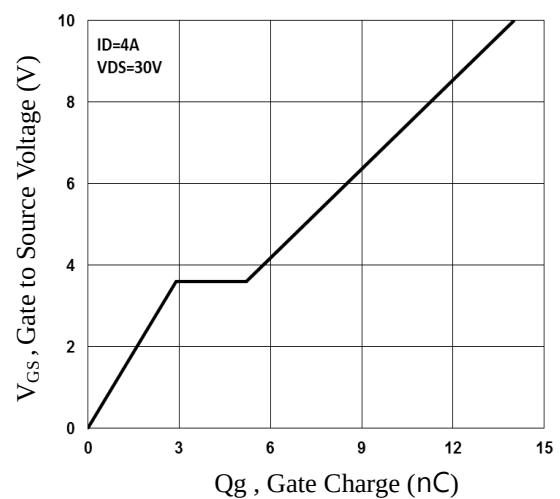
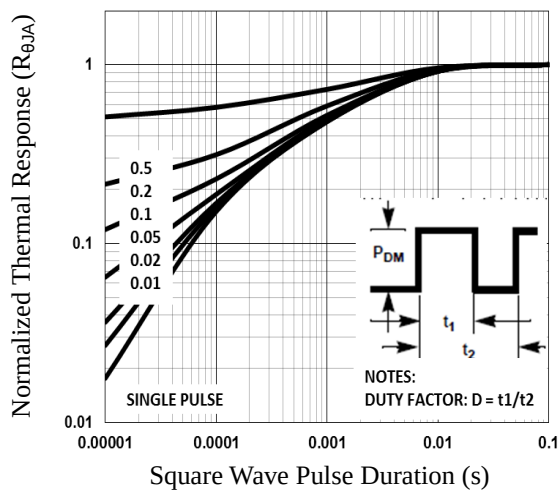
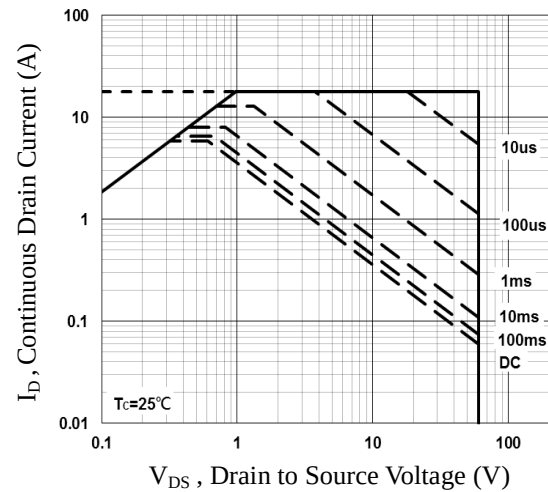
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =5A	---	63	73	mΩ
		V _{GS} =4.5V, I _D =3A	---	73	80	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	1.8	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-4.2	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =4A	---	4.2	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =30V, V _{GS} =10V, I _D =4A	---	14	---	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	2.9	---	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	2.3	---	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =30V, V _{GS} =10V, R _G =3.3Ω I _D =1A	---	3.9	---	ns
T _r	Rise Time ^{2, 3}		---	12.6	---	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	23.1	---	
T _f	Fall Time ^{2, 3}		---	6.7	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, F=1MHz	---	800	---	pF
C _{oss}	Output Capacitance		---	380	---	
C _{rss}	Reverse Transfer Capacitance		---	115	---	
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	---	1.7	---	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	---	---	5.0	A
I _{SM}	Pulsed Source Current		---	---	10	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V


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

P-CH Electrical Characteristics (T_J=25 °C, unless otherwise

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-60	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.05	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-60V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
		V _{DS} =-48V, 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

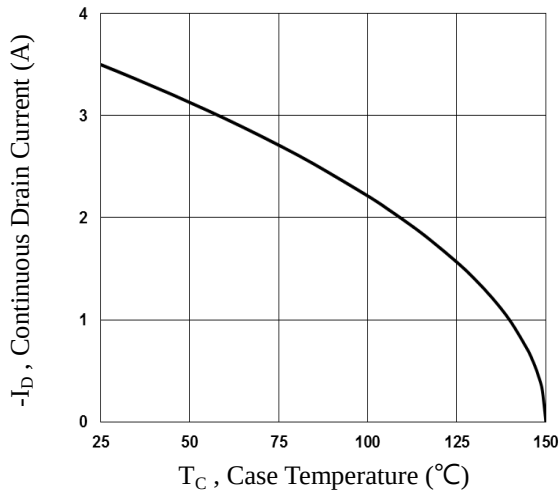
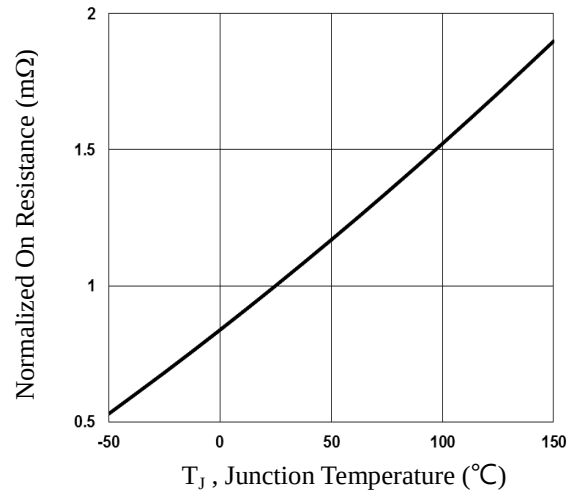
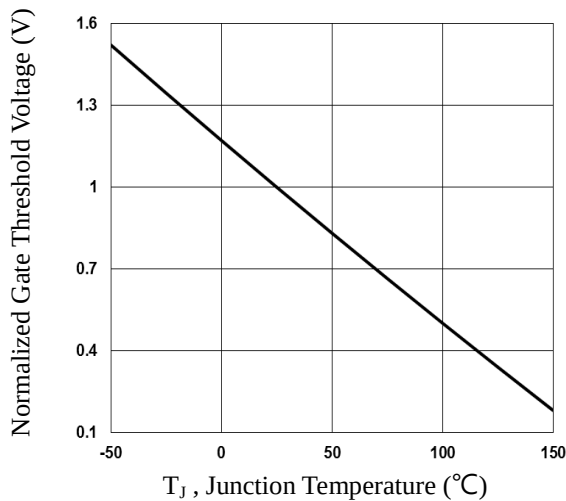
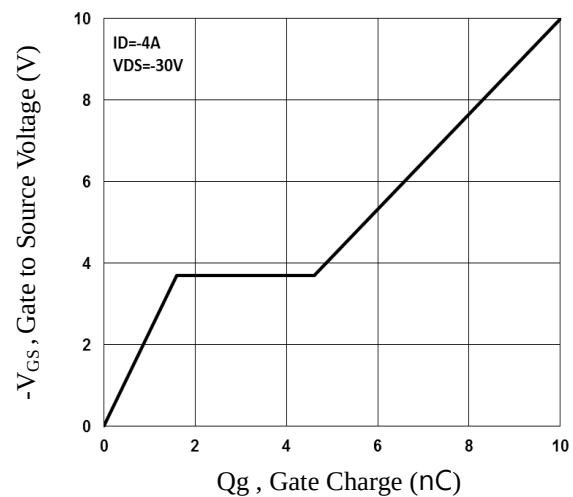
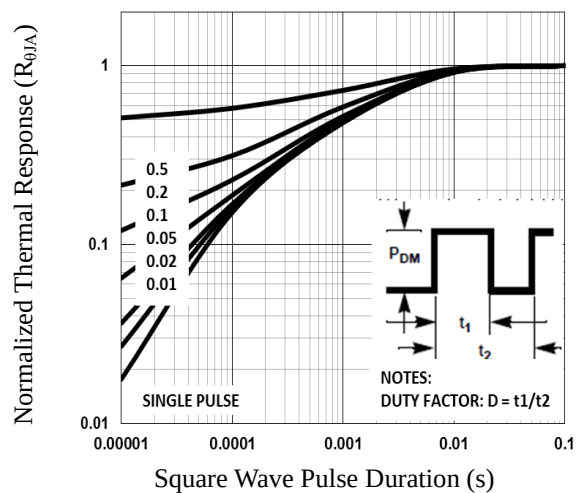
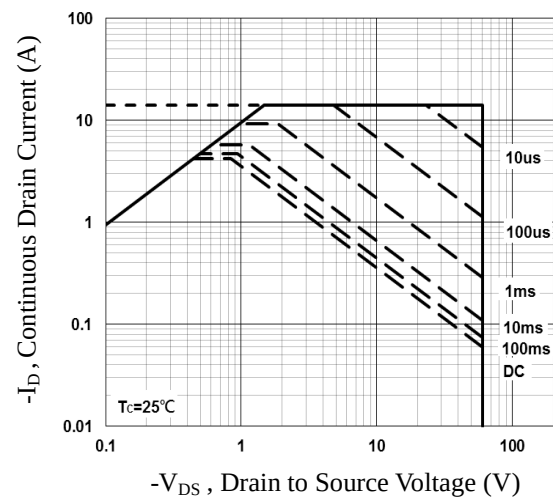
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-3A	---	115	140	mΩ
		V _{GS} =-4.5V, I _D =-2A	---	145	175	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.8	-2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	3	---	mV/°C
gfs	Forward Transconductance	V _{DS} =-10V, I _D =-6A	---	5.5	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2,3}	V _{DS} =-30V, V _{GS} =-10V, I _D =-4A	---	10	---	nC
Q _{gs}	Gate-Source Charge ^{2,3}		---	1.6	---	
Q _{gd}	Gate-Drain Charge ^{2,3}		---	3	---	
T _{d(on)}	Turn-On Delay Time ^{2,3}	V _{DD} =-30V, V _{GS} =-10V, R _G =6Ω I _D =-1A	---	8	---	ns
T _r	Rise Time ^{2,3}		---	15.4	---	
T _{d(off)}	Turn-Off Delay Time ^{2,3}		---	42.8	---	
T _f	Fall Time ^{2,3}		---	8.4	---	
C _{iss}	Input Capacitance	V _{DS} =-30V, V _{GS} =0V, F=1MHz	---	785	---	pF
C _{oss}	Output Capacitance		---	175	---	
C _{rss}	Reverse Transfer Capacitance		---	112	---	

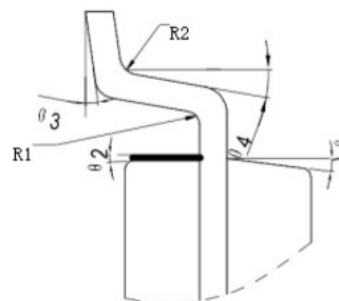
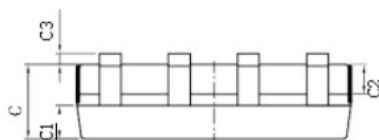
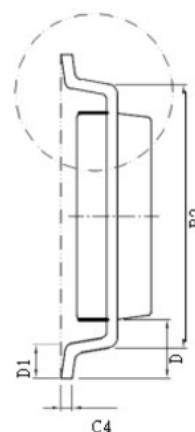
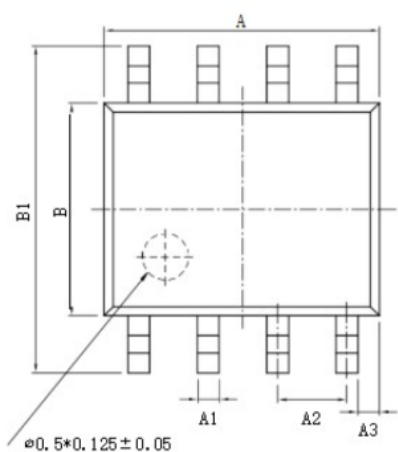
Drain-Source Diode Characteristics and Maximum Ratings

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	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S = - 1A, T _J =25°C	---	---	-1.2	V


Fig.7 Continuous Drain Current vs. T_C

Fig.8 Normalized $R_{DS(on)}$ vs. T_J

Fig.9 Normalized V_{th} vs. T_J

Fig.10 Gate Charge Waveform

Fig.11 Normalized Transient Impedance

Fig.12 Maximum Safe Operation Area

Physical Dimensions

SOP8



Symbols	Dimension(mm)		Symbols	Dimension(mm)	
	Min	Max		Min	Max
A	4.80	5.00	C3	0.05	0.20
A1	0.356	0.456	C4	0.203	0.233
A2	1.27 TYP		D	1.05 TYP	
A3	0.345 TYP		D1	0.40	0.80
B	3.80	4.00	R1	0.20 TYP	
B1	5.80	6.20	R2	0.20 TYP	
B2	5.00 TYP		$\theta 1$	17° TYP4	
C	1.30	1.60	$\theta 2$	13° TYP4	
C1	0.55	0.65	$\theta 3$	0° ~ 8°	
C2	0.55	0.65	$\theta 4$	4° ~ 12°	