

Description:

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

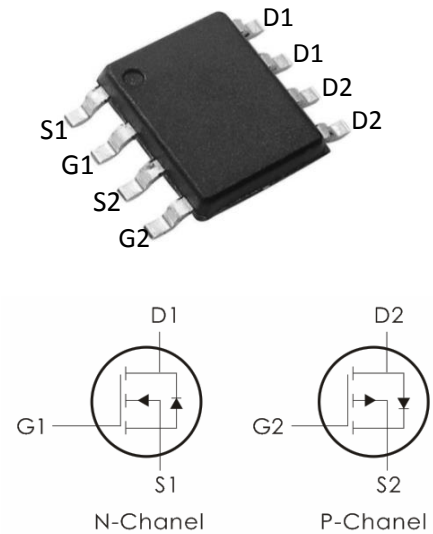
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=60V, I_D=5A, R_{DS(on)} < 36m\Omega @ V_{GS}=10V$

P-Channel: $V_{DS}=-60V, I_D=-4A, R_{DS(on)} < 90m\Omega @ V_{GS}=-10V$

- 1) High Power and current handing capability.
- 2) Lead free product is acquired.
- 3) Surface Mount Package.



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
DOS4612E	S4612E	SOP-8D	3000 pcs/Reel

Absolute Maximum Ratings: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Drain Current-Continuous @ $T_A=25^\circ\text{C}^1$	5	-4	A
	Drain Current-Continuous @ $T_A=70^\circ\text{C}^1$	3.5	-3.2	
I_{DM}	Pulsed Drain Current- ²	18	-14	
EAS	Single Pulse Avalanche Energy ³	22	29.7	mJ
P_D	Power Dissipation ⁴	1.5	1.5	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	-55 to +150	$^\circ\text{C}$

Thermal Characteristics:

Symbol	Parameter	N-Channel Max	P-Channel Max	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ¹	85	85	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction Case ¹	25	25	

N-Channel Electrical Characteristics: ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
ON/Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =48V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate -Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1	---	2.5	V
R _{DS(ON)}	Drain-Source On Resistance ²	V _{GS} =10V, I _D =4A	---	30	36	m Ω
		V _{GS} =4.5V, I _D =3A	---	36	46	
G _{FS}	Forward Transconductance	V _{DS} =5V, I _D =4A	---	28.3	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V, f=1MHz	---	2.5	---	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	1027	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	46	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} =30V, I _D =4A V _{GS} =10V , R _G =3.3 Ω	---	3	---	ns
t _r	Rise Time		---	34	---	ns
t _{d(off)}	Turn-Off Delay Time		---	23	---	ns
t _f	Fall Time		---	6	---	ns
Q _g	Total Gate Charge （4.5V）	V _{GS} =10V, V _{DS} =48V, I _D =4A	---	19	---	nC
Q _{gs}	Gate-Source Charge		---	2.6	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	4.1	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Source-Drain Diode Forward Voltage ²	V _{GS} =0V, I _S =1A , T _J =25℃	---	---	1.2	V
I _S	Continuous Source Current ^{1,5}	V _D =V _G =0V	---	---	4.5	A
I _{SM}	Pulsed Source Current ^{2,5}		---	---	18	
t _{rr}	Reverse Recovery Time	I _F =4A , dI/dt=100A/μs ,	---	12.1	---	nS
Q _{rr}	Reverse Recovery Charge	T _J =25℃	---	6.7	---	nC

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is $V_{DS}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=21A$
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

Typical Characteristics: ($T_A=25^\circ C$ unless otherwise noted)

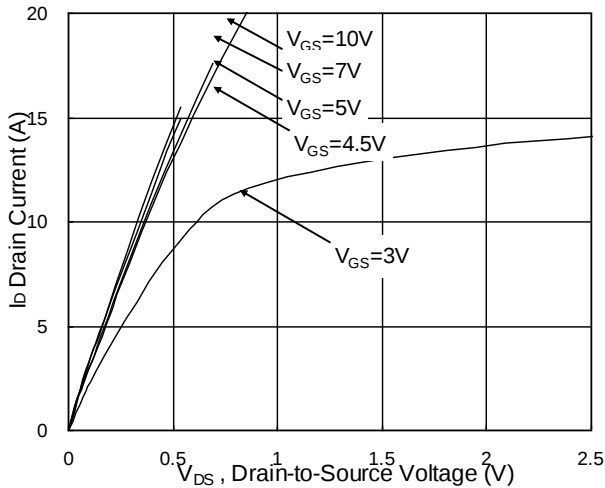


Fig.1 Typical Output Characteristics

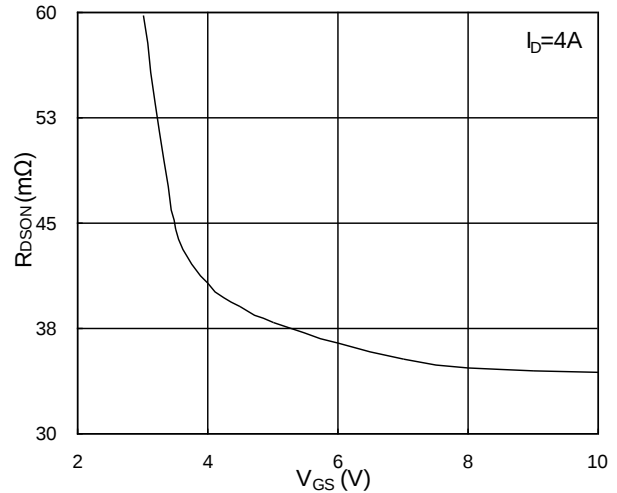


Fig.2 On-Resistance vs. Gate-Source

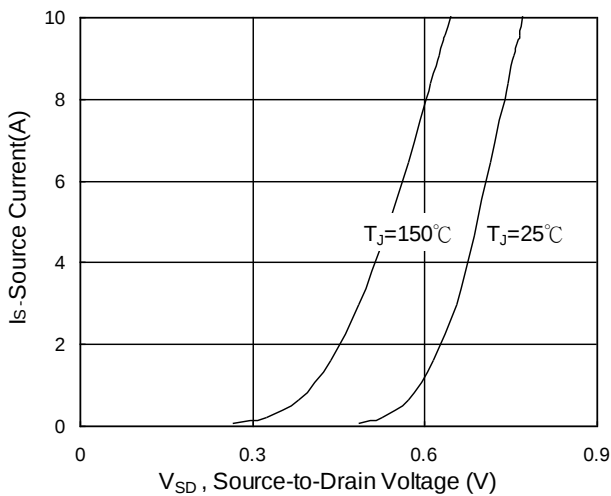


Fig.3 Forward Characteristics Of Reverse

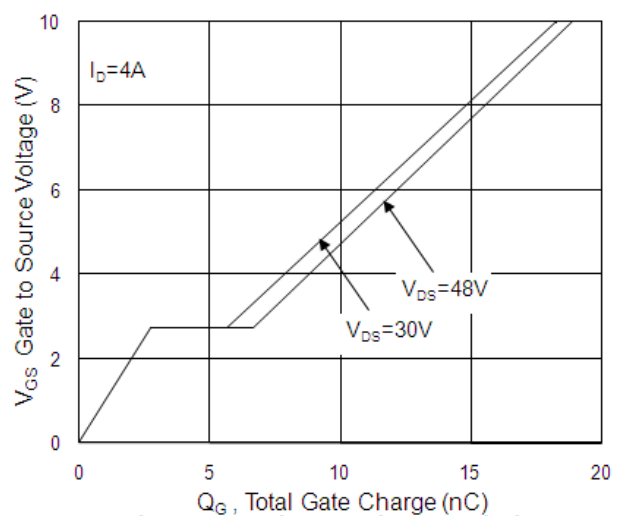


Fig.4 Gate-Charge Characteristics

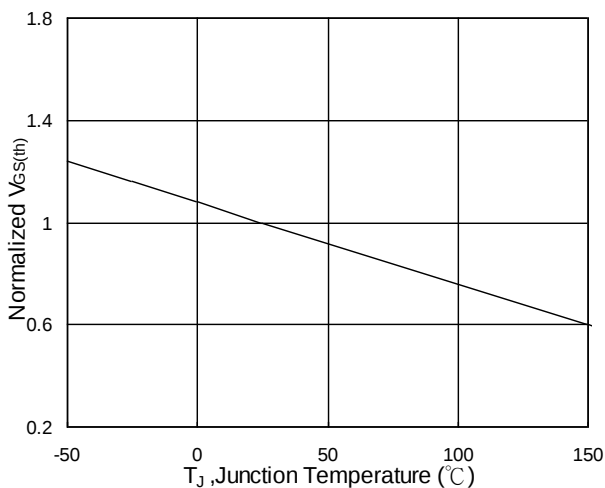


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

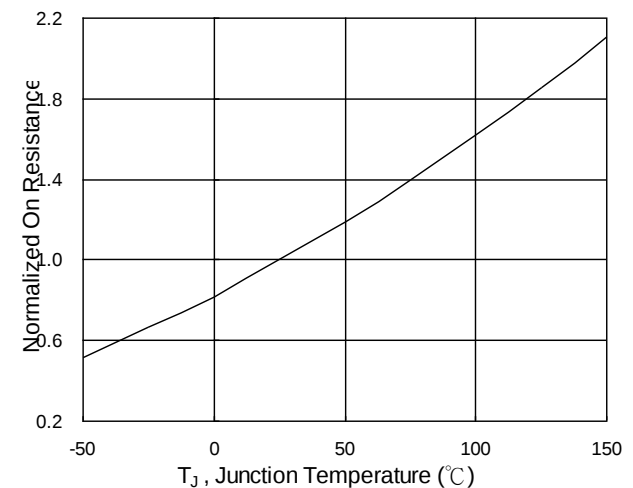


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

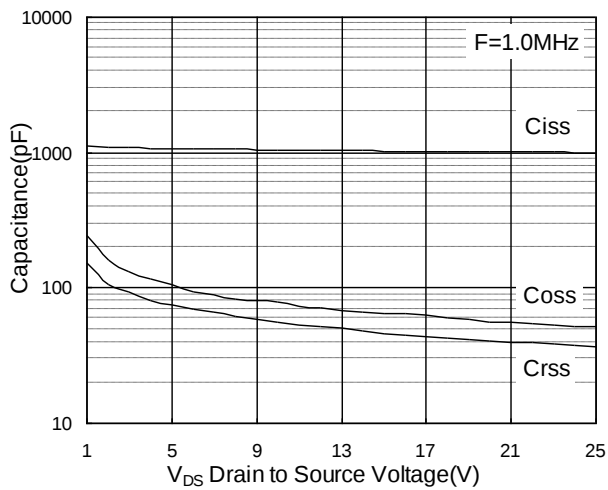


Fig.7 Capacitance

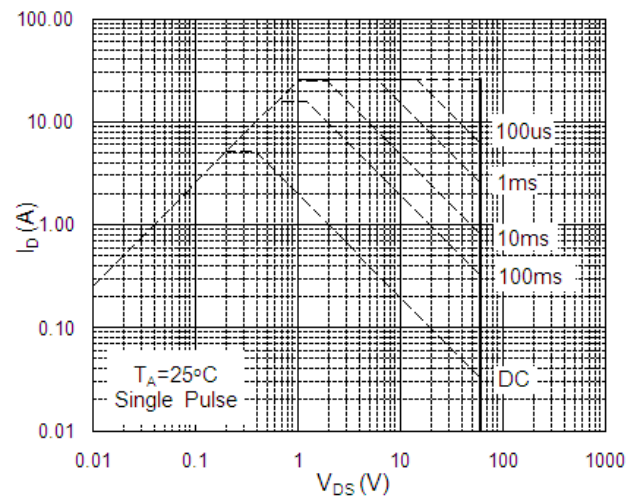


Fig.8 Safe Operating Area

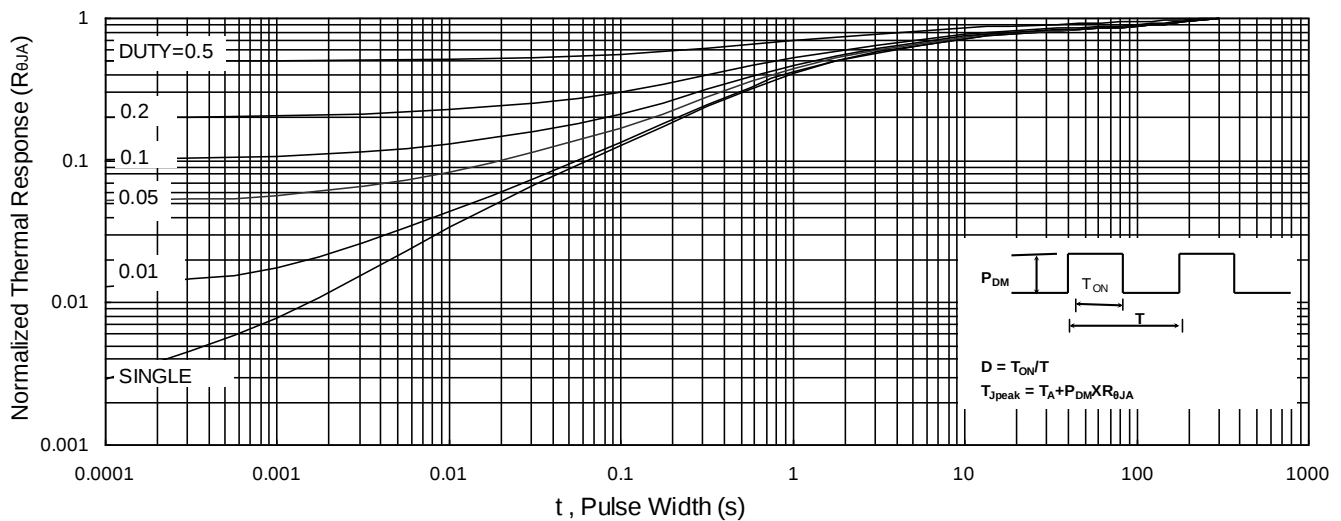


Fig.9 Normalized Maximum Transient Thermal Impedance

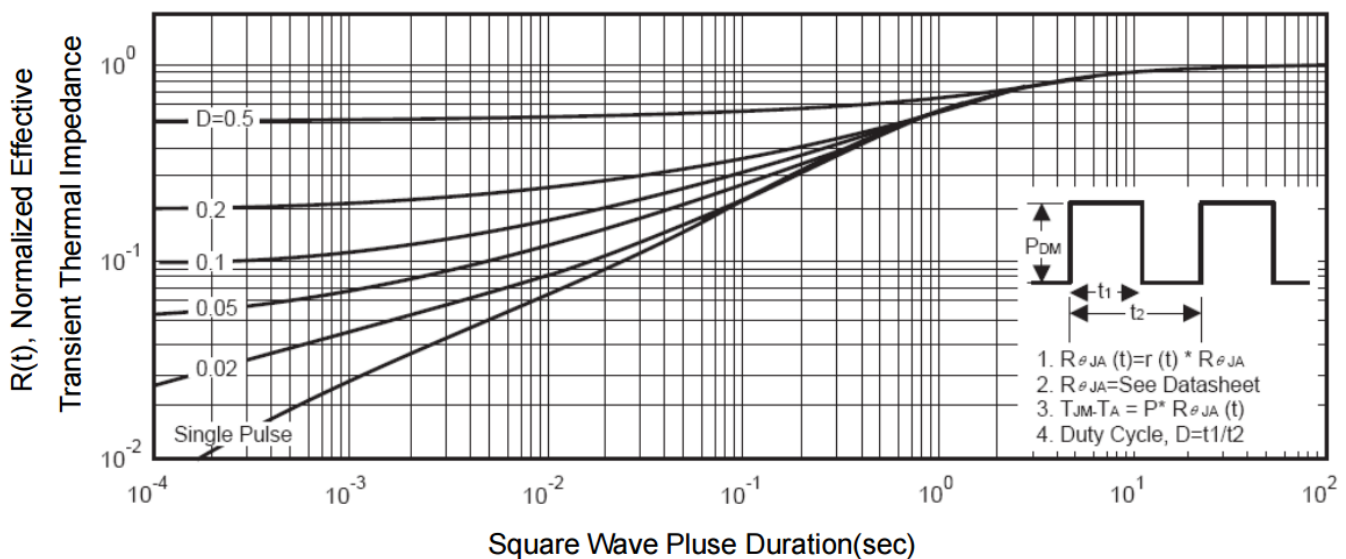


Figure11. Normalized Maximum Transient Thermal Impedance

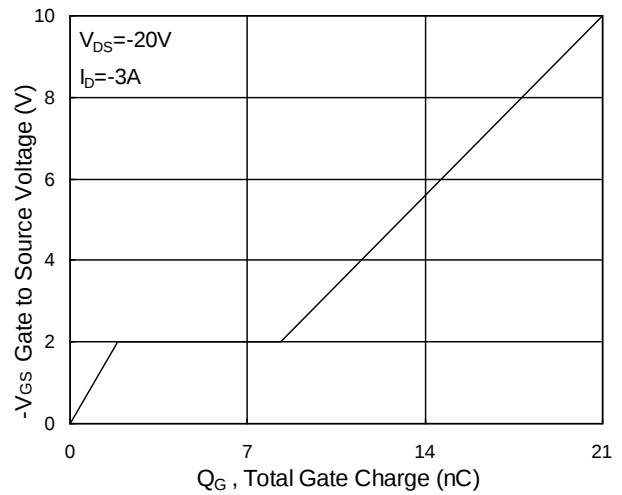
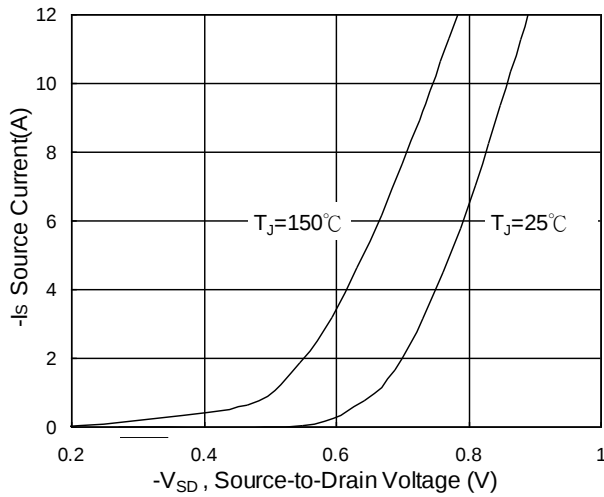
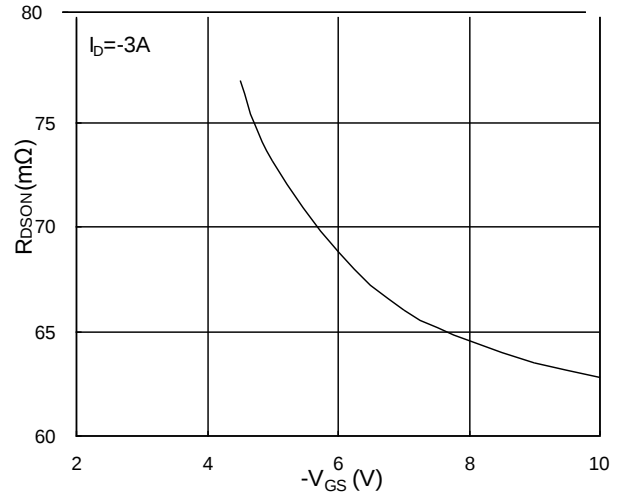
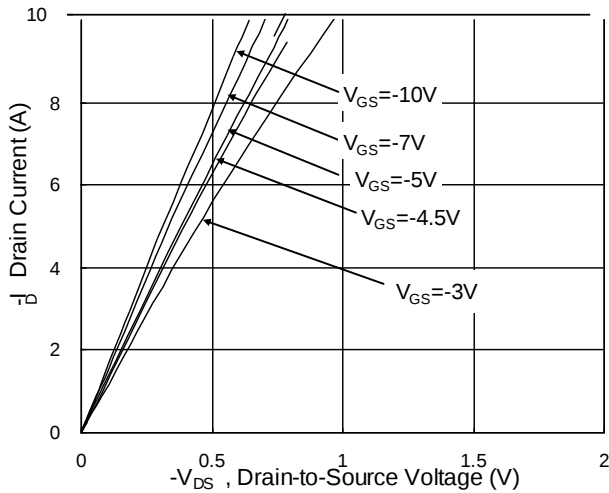
P-Channel Electrical Characteristics: ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
ON/Off States						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V,I _D =-250 μ A	-60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-48V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics ³						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =-250 μ A	-1.2	---	-2.5	V
R _{DS(ON)}	Drain-Source On Resistance ²	V _{GS} =-10V,I _D =-3A	---	80	90	m Ω
		V _{GS} =-4.5V,I _D =-2A	---	90	125	
G _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-3A	---	8.7	---	S
R _g	Gate Resistance	V _{DS} = 0 V , V _{GS} =0V f=1MHz	---	15	---	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	---	900	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	47	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} =-15V, _{GS} =-10V,	---	8.8	---	ns
t _r	Rise Time	R _{GEN} =3.3 Ω ,I _D =-1A	---	19.6	---	ns
t _{d(off)}	Turn-Off Delay Time		---	47.2	---	ns
t _f	Fall Time		---	9.6	---	ns
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-48V, I _D =-3A	---	10	---	nC
Q _{gs}	Gate-Source Charge		---	1.9	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	6.5	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Source-Drain Diode Forward Voltage ³	V _{GS} =0V,I _S =-6.5A	---	---	-1.2	V
I _S	Continuous Source Current ^{1,5}	V _D =V _G =0V	---	---	-4.1	A
I _{SM}	Diode Forward Voltage ²		---	---	-14	

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-24.4A$
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics: ($T_A=25^\circ C$ unless otherwise noted)



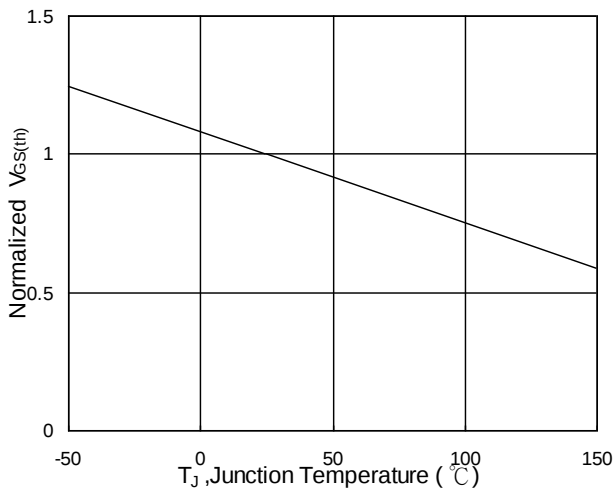


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

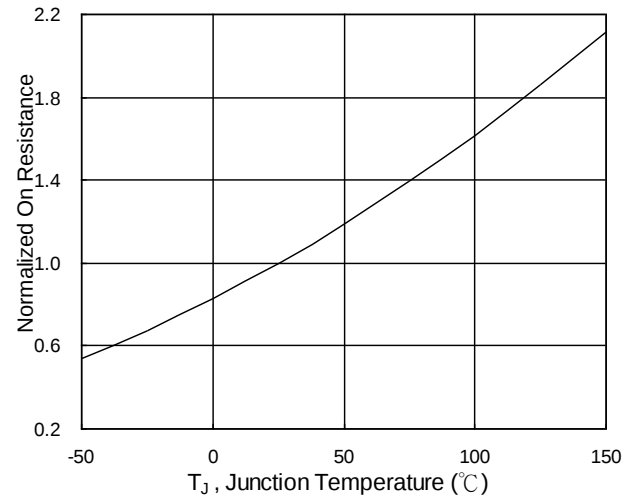


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

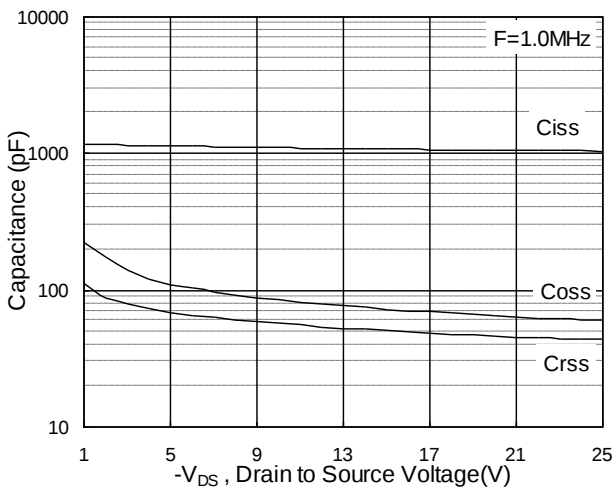


Fig.7 Capacitance

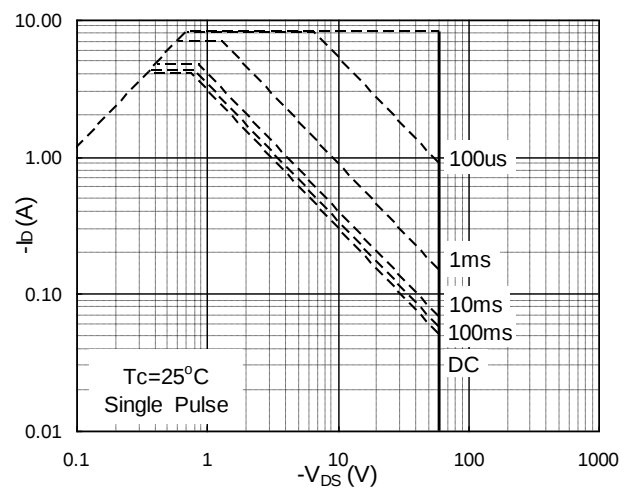


Fig.8 Safe Operating Area

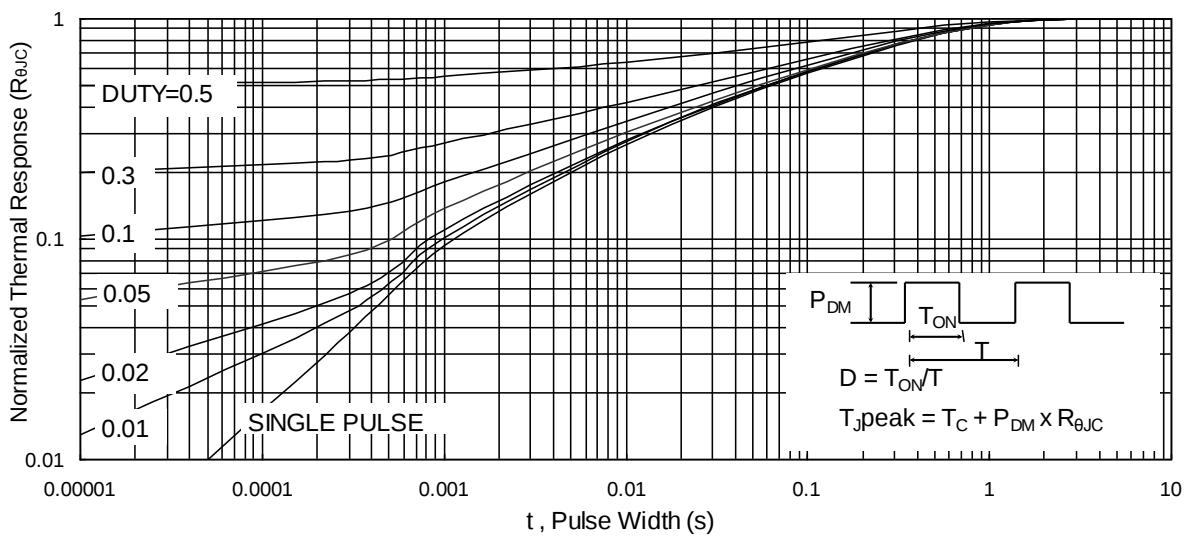
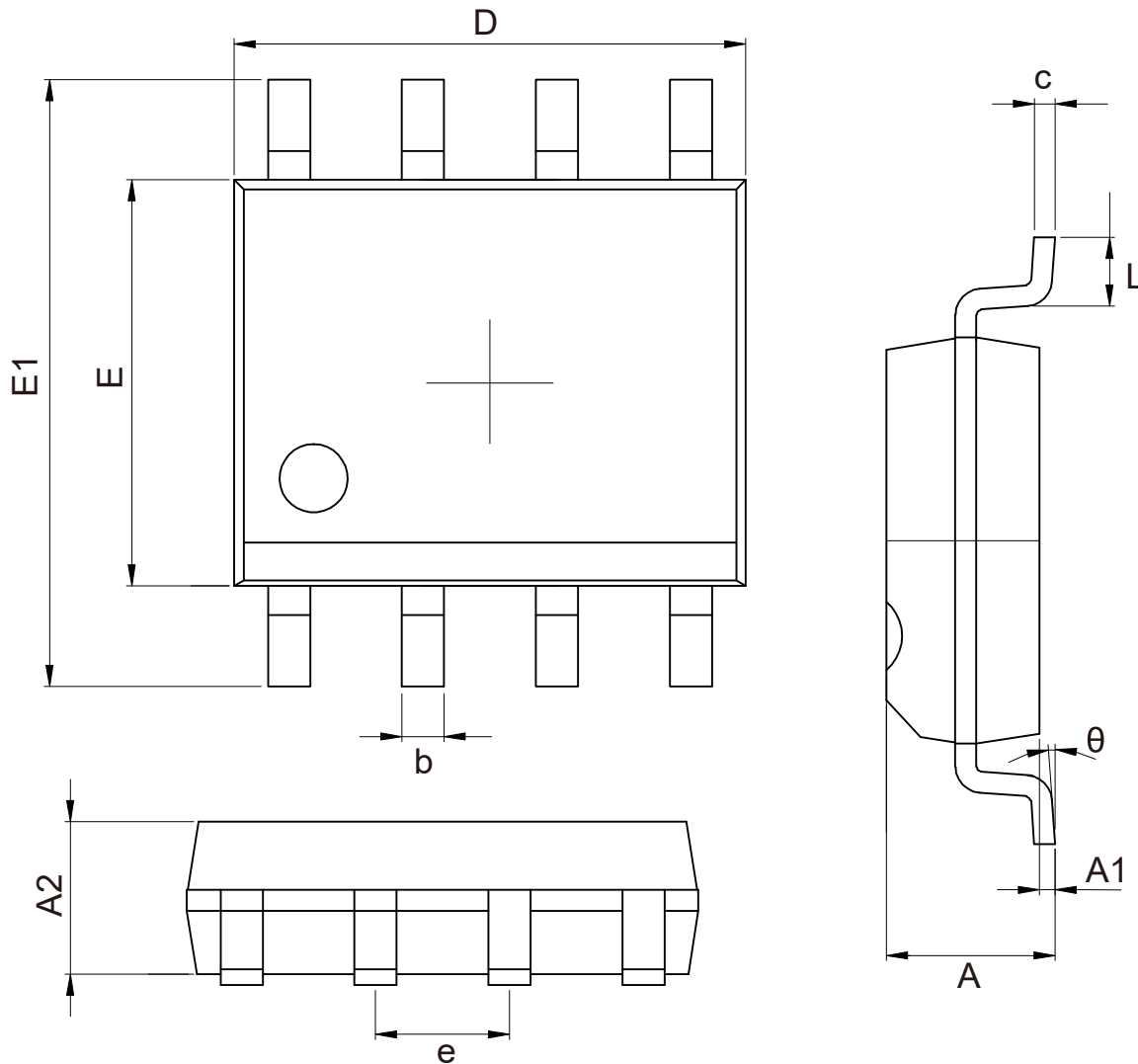


Fig.9 Normalized Maximum Transient Thermal Impedance

SOP-8DPackage Information:



COMMON DIMENSIONS			
CUNITS MEASURE=MILLIMETER			
SYMBOL	MIN	NOM	MAX
A	1.350	—	1.750
A1	0.100	—	0.250
A2	1.350	—	1.550
b	0.330	—	0.510
c	0.170	—	0.250
D	4.700	—	5.100
E	3.800	3.900	4.000
E1	5.800	—	6.200
e	1.270BSC		
L	0.400	—	1.270
θ	0°	—	8°

Unit:mm

Marking Information:

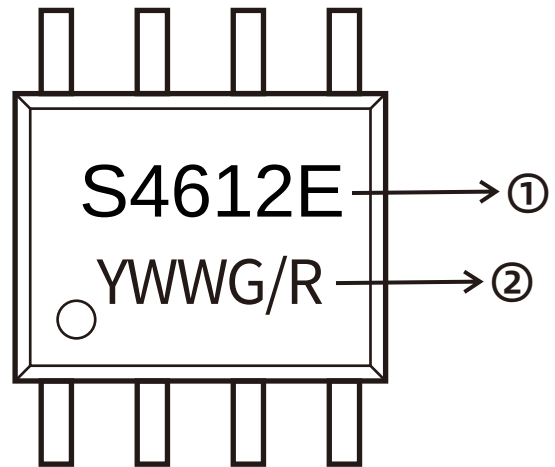
①. Part NO.

②. Date Code(YWWG / R)

Y : Year Code , last digit of the year

WW : Week Code(01-53)

G/R : G(Green) /R(Lead Free)

**Previous Version**

Version	Date	Subjects (major changes since last revision)
2.0	2024-07-29	Release of final version

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