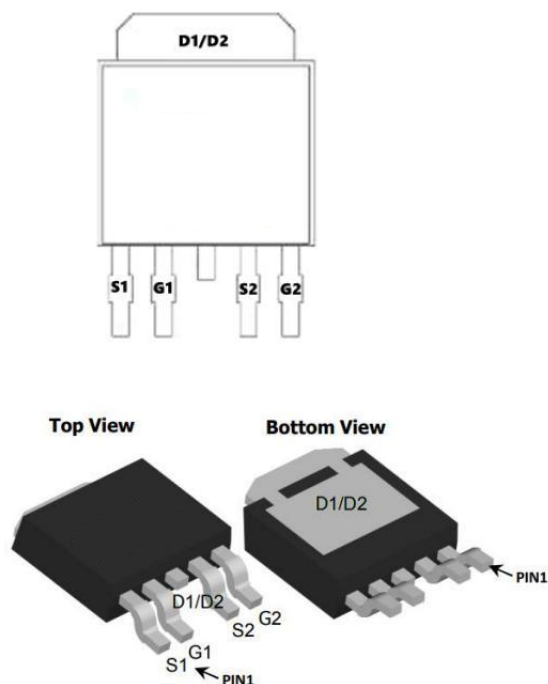


Description

The SX25G04GD uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

$V_{DS} = 40V$ $I_D = 28A$

$R_{DS(ON)} < 24m\Omega$ @ $V_{GS}=10V$

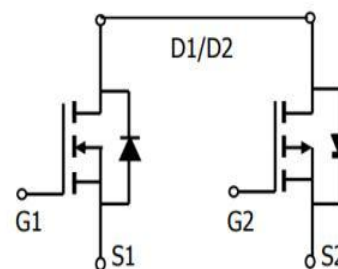
$V_{DS} = -40V$ $I_D = 25A$

$R_{DS(ON)} < 40m\Omega$ @ $V_{GS}=10V$

Application

Boost driver

Brushless motor



Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D @ T_c=25^\circ C$	Continuous Drain Current, V_{GS} @ 10V ¹	28	-25	A
$I_D @ T_c=100^\circ C$	Continuous Drain Current, V_{GS} @ 10V ¹	18	-16	A
I_{DM}	Pulsed Drain Current ²	46	-40	A
EAS	Single Pulse Avalanche Energy ³	28	66	mJ
I_{AS}	Avalanche Current	17.8	-27.2	A
$P_D @ T_c=25^\circ C$	Total Power Dissipation ⁴	25	31.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	5		$^\circ C/W$

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	40	44	---	V
ΔBVDSS/ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.034	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =10V , I _D =5A	---	18	26	mΩ
		V _{GS} =4.5V , I _D =4A	---	25.0	35	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	-4.56	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =32V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =32V , V _{GS} =0V , T _J =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =5V , I _D =5A	---	14	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	2.6	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =20V , V _{GS} =4.5V , I _D =5A	---	5.5	---	nC
Q _{gs}	Gate-Source Charge		---	1.25	---	
Q _{gd}	Gate-Drain Charge		---	2.5	---	
Td(on)	Turn-On Delay Time	V _{DD} =20V , V _{GS} =10V , R _G =3.3Ω I _b =1A	---	8.9	---	ns
T _r	Rise Time		---	2.2	---	
Td(off)	Turn-Off Delay Time		---	41	---	
T _f	Fall Time		---	2.7	---	
C _{iss}	Input Capacitance	V _{DS} =15V , V _{GS} =0V , f=1MHz	---	593	---	pF
C _{oss}	Output Capacitance		---	76	---	
Crss	Reverse Transfer Capacitance		---	56	---	
I _s	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current	---	---	6.1	A
ISM	Pulsed Source Current ^{2,5}		---	---	23	A
VSD	Diode Forward Voltage ²	V _{GS} =0V , I _s =1A , T _J =25°C	---	---	1.2	V

Note :

- 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 ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=20A
- 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.

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	-40	-44	---	V
ΔBVDSS/ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA	---	-0.02	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-10V , I _D =-6A	---	32	42	mΩ
		V _{GS} =-4.5V , I _D =-3A	---	48	60	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.2	-1.7	-2.5	V
ΔVGS(th)	V _{GS(th)} Temperature Coefficient		---	3.72	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =-32V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =-32V , V _{GS} =0V , T _J =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =-5V , I _D =-6A	---	13	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-20V , V _{GS} =-4.5V , I _D =-6A	---	11.5	---	nC
Q _{gs}	Gate-Source Charge		---	3.5	---	
Q _{gd}	Gate-Drain Charge		---	3.3	---	
Td(on)	Turn-On Delay Time	V _{DD} =-15V , V _{GS} =-10V , R _G =3.3Ω, I _b =-1A	---	22	---	ns
T _r	Rise Time		---	15.7	---	
Td(off)	Turn-Off Delay Time		---	59	---	
T _f	Fall Time		---	5.5	---	
C _{iss}	Input Capacitance	V _{DS} =-15V , V _{GS} =0V , f=1MHz	---	1415	---	pF
C _{oss}	Output Capacitance		---	134	---	
Crss	Reverse Transfer Capacitance		---	102	---	
I _s	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current	---	---	-6	A
ISM	Pulsed Source Current ^{2,5}		---	---	-22	A
VSD	Diode Forward Voltage ²	V _{GS} =0V , I _s =-1A , T _J =25°C	---	---	-1.2	V

Note :

- 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 ≤ 300us , duty cycle ≤ 2%
- 3、 The EAS data shows Max. rating . The test condition is V_{DD}=-25V,V_{GS}=-10V,L=0.1mH,I_{AS}=-24A
- 4、 The power dissipation is limited by 150°C junction temperature
- 5 、 The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

N-Channel Typical Characteristics

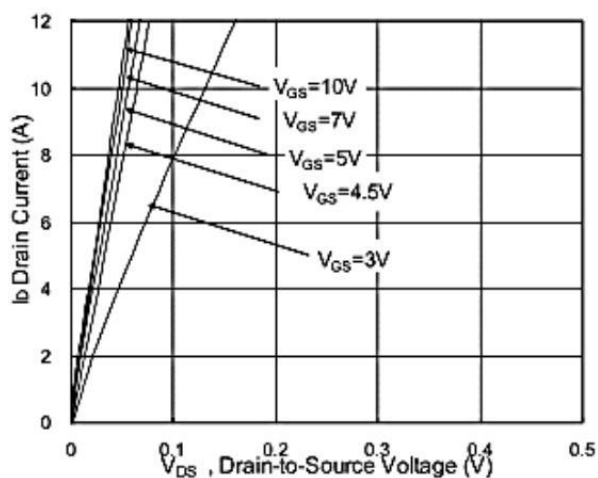


Fig.1 Typical Output Characteristics

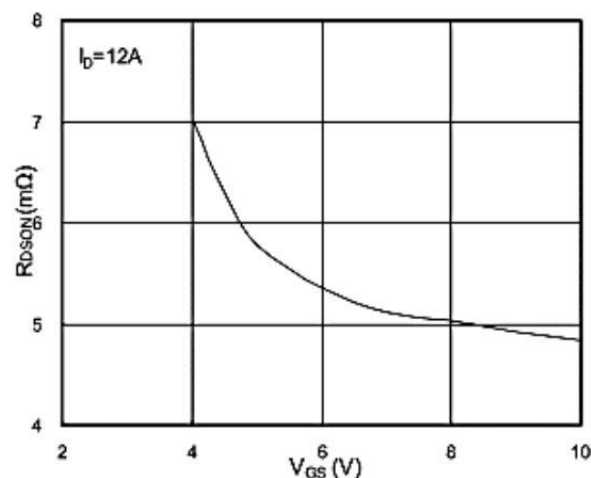


Fig.2 On-Resistance vs. G-S Voltage

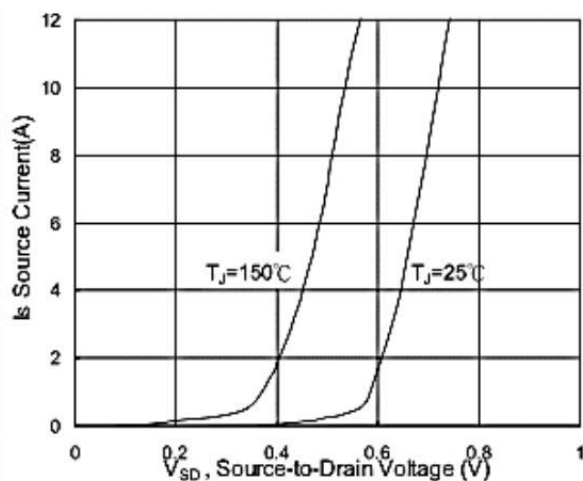


Fig.3 Forward Characteristics Of Reverse

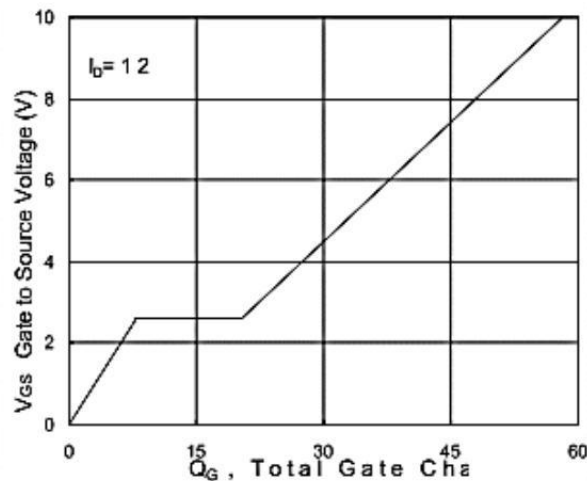


Fig.4 Gate-Charge Characteristics

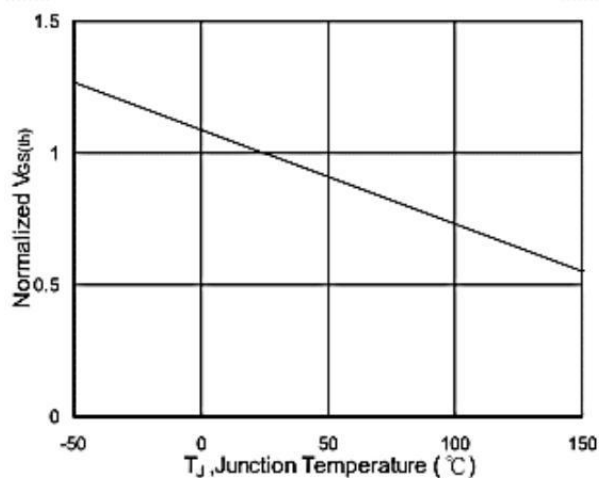


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

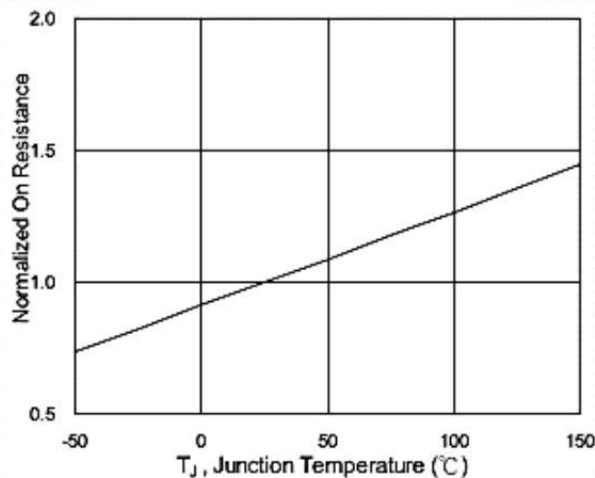


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

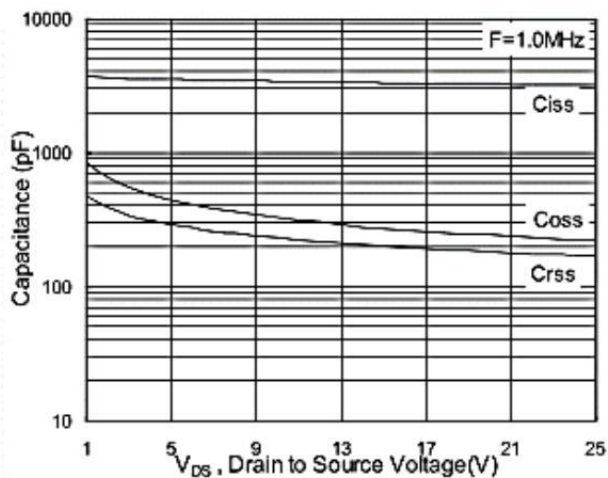


Fig.7 Capacitance

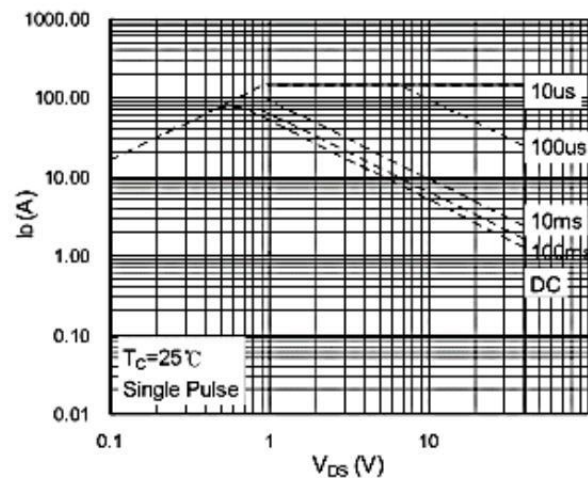


Fig.8 Safe Operating Area

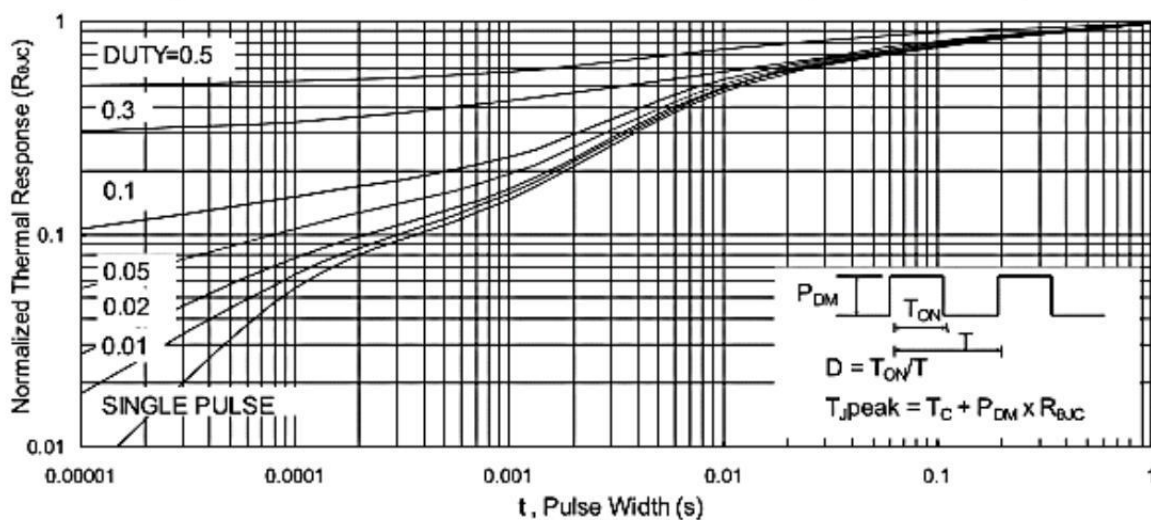


Fig.9 Normalized Maximum Transient Thermal Impedance

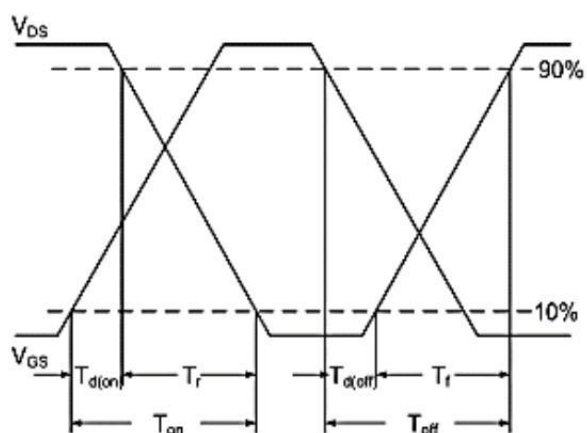


Fig.10 Switching Time Waveform

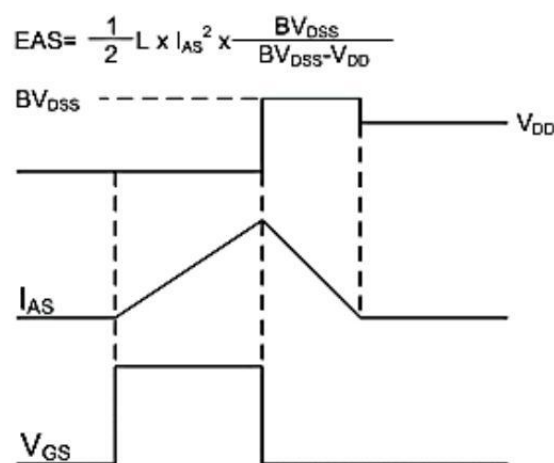


Fig.11 Unclamped Inductive Switching Wave

P-Channel Typical Characteristics

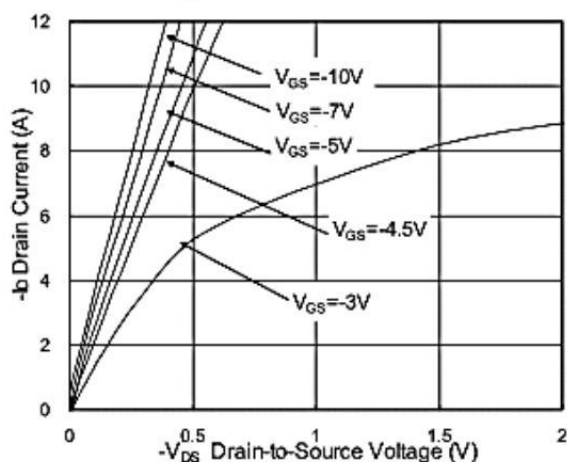


Fig.1 Typical Output Characteristics

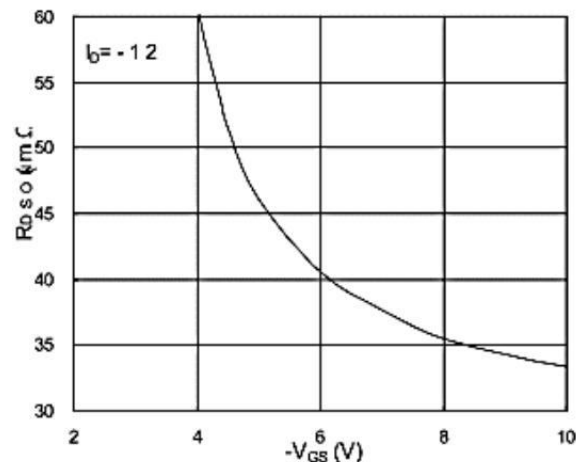


Fig.2 On-Resistance v.s Gate-Source

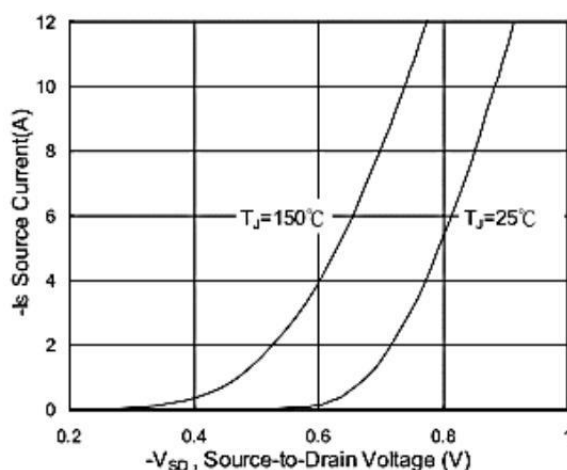


Fig.3 Forward Characteristics of Reverse

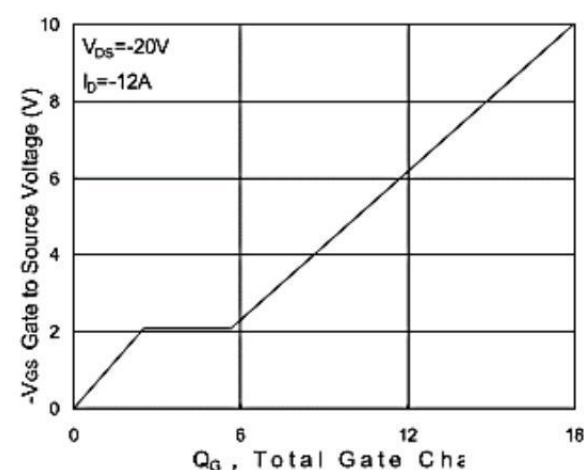


Fig.4 Gate-Charge Characteristics

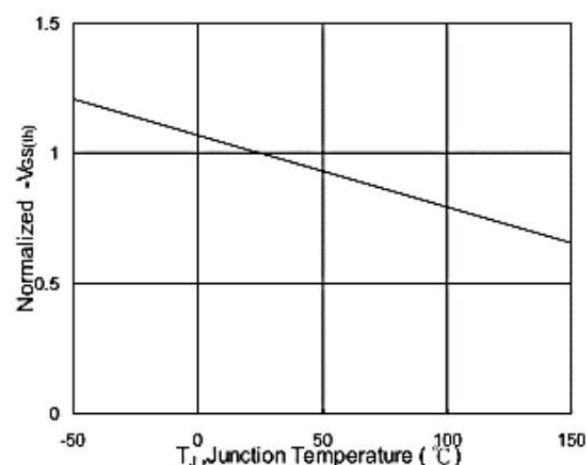


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

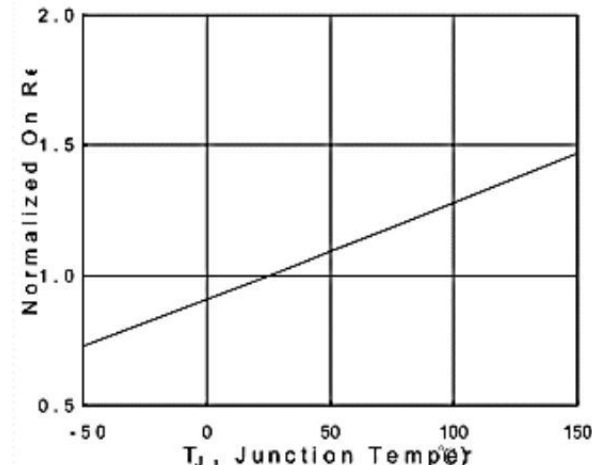


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

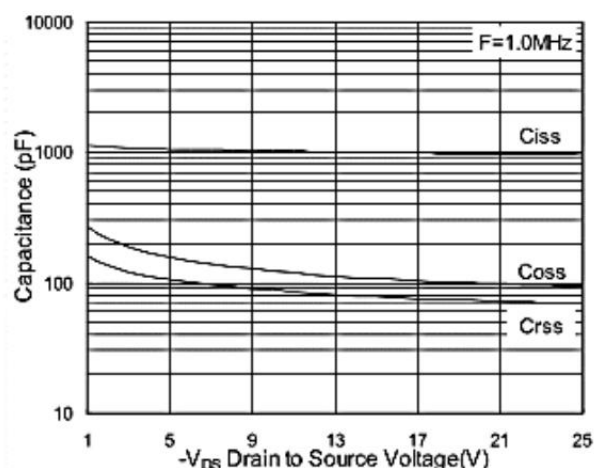


Fig.7 Capacitance

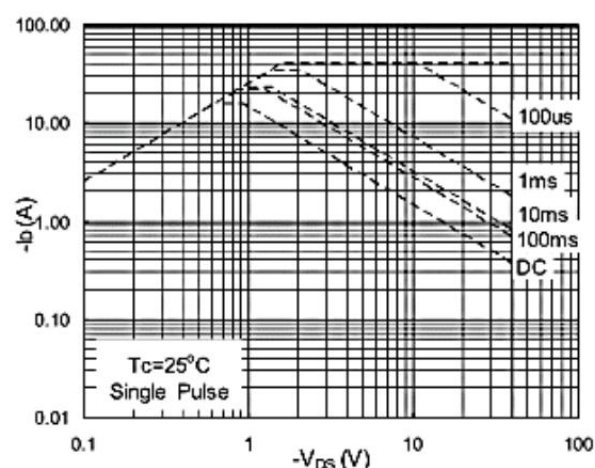


Fig.8 Safe Operating Area

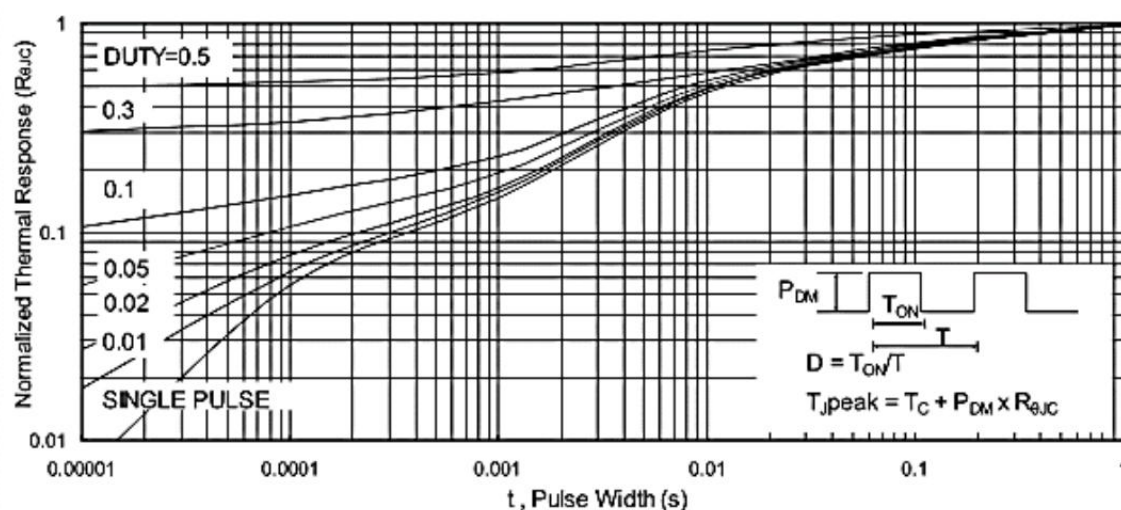


Fig.9 Normalized Maximum Transient Thermal Impedance

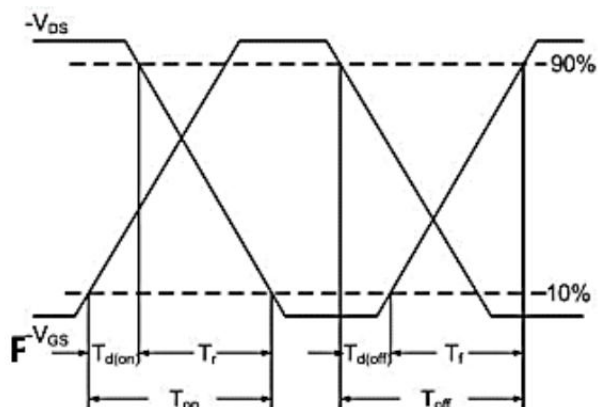


Fig.10 Switching Time Waveform

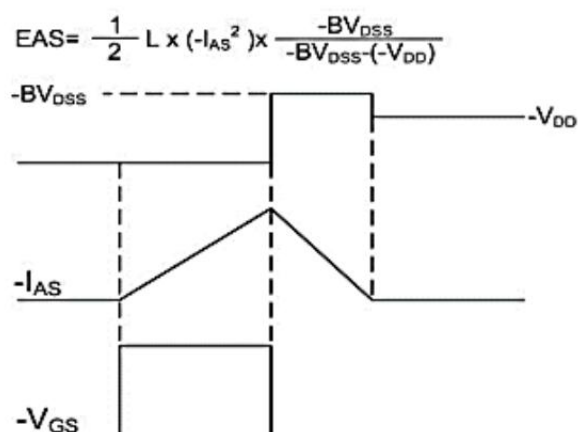
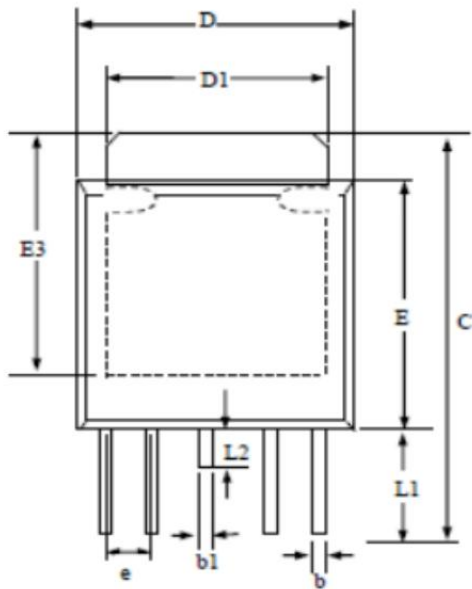


Fig.11 Unclamped Inductive Waveform

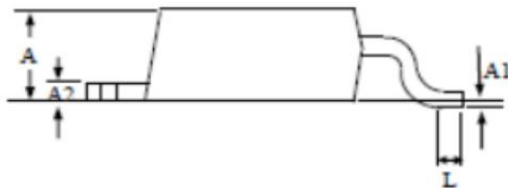
Package Mechanical Data:TO-252-4L



SYMBOLS	Millimeters		
	MIN	NOM	MAX
D	6.30	6.55	6.80
D1	4.80	5.35	5.90
C	9.30	9.75	10.20
E	5.30	5.80	6.30
E3	4.50	5.15	5.80
L	0.90	1.35	1.80
L1	2.00	2.53	3.05
L2	0.50	0.85	1.20
b	0.30	0.50	0.70
b1	0.40	0.60	0.80
A	2.10	2.30	2.50
A2	0.40	0.53	0.65
A1	0.00	0.10	0.20
e	1.20	1.30	1.40

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	TO-252-4L		2500