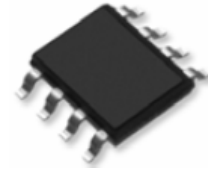


Description

The LM4606 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.

Dimensions SOP-8



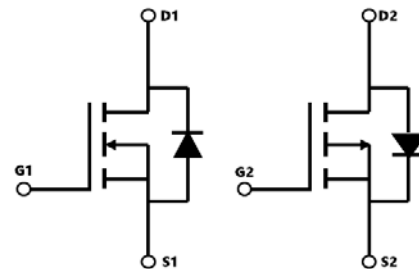
General Features

- $V_{DS} = 30V$ $I_D = 6.2A$
 $R_{DS(ON)} < 25m\Omega @ V_{GS}=10V$ (Typ. 18m Ω)
- $V_{DS} = -30V$ $I_D = -4.8A$
 $R_{DS(ON)} < 60m\Omega @ V_{GS}=-10V$ (Typ. 48m Ω)

Application

- Lithium battery protection
- Wireless impact
- Mobile phone fast charging

Pin Configuration



Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LM4606	AP4606B	SOP-8	Ø330mm	12mm	3000 units

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	N-Ch	P-Ch	Units
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	6.2	-4.8	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5	-3.8	A
I_{DM}	Pulsed Drain Current ²	24	-24	A
EAS	Single Pulse Avalanche Energy ³	26.6	37	mJ
I_{AS}	Avalanche Current	12.7	15	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation ⁴	1.5	1.5	W
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150		$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	85		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	60		$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	31.5	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.023	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =5A	---	18	25	mΩ
		V _{GS} =4.5V, I _D =3A	---	24	40	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	1.6	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-4.2	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =6A	---	5.8	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.3	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =20V, V _{GS} =4.5V, I _D =6A	---	5	---	nC
Q _{gs}	Gate-Source Charge		---	1.11	---	
Q _{gd}	Gate-Drain Charge		---	2.61	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =12V, V _{GS} =10V, R _G =3.3Ω I _D =6A	---	7.7	---	ns
T _r	Rise Time		---	46	---	
T _{d(off)}	Turn-Off Delay Time		---	11	---	
T _f	Fall Time		---	3.6	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	416	---	pF
C _{oss}	Output Capacitance		---	62	---	
C _{rss}	Reverse Transfer Capacitance		---	51	---	
I _s	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	6.2	A
I _{SM}	Pulsed Source Current ^{2,6}		---	---	24	A
V _{SD}	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 power dissipation is limited by 150°C junction temperature
4. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	-32	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	---	-0.02	---	V/ $^{\circ}\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-4.1A$	---	42	55	m Ω
		$V_{GS}=-4.5V, I_D=-3.5A$	---	68	85	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.7	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.32	---	mV/ $^{\circ}\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	-1	uA
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^{\circ}\text{C}$	---	---	-5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	---	4.7	---	S
Rg	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	24	---	Ω
Qg	Total Gate Charge (-4.5V)	$V_{DS}=-20V, V_{GS}=-4.5V, I_D=-5A$	---	5.22	---	nC
Qgs	Gate-Source Charge		---	1.25	---	
Qgd	Gate-Drain Charge		---	2.3	---	
Td(on)	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-1A$	---	18.4	---	ns
Tr	Rise Time		---	11.4	---	
Td(off)	Turn-Off Delay Time		---	39.4	---	
Tf	Fall Time		---	5.2	---	
Ciss	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	463	---	pF
Coss	Output Capacitance		---	82	---	
Crss	Reverse Transfer Capacitance		---	68	---	
Is	Continuous Source Current ^{1,6}	$V_G=V_D=0V, \text{Force Current}$	---	---	-4	A
ISM	Pulsed Source Current ^{2,6}		---	---	-24	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1	V

Note :

- 1、 The data tested by surface mounted on a 1 inch FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、 The power dissipation is limited by 150°C junction temperature
- 4、 The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Channel Typical Characteristics

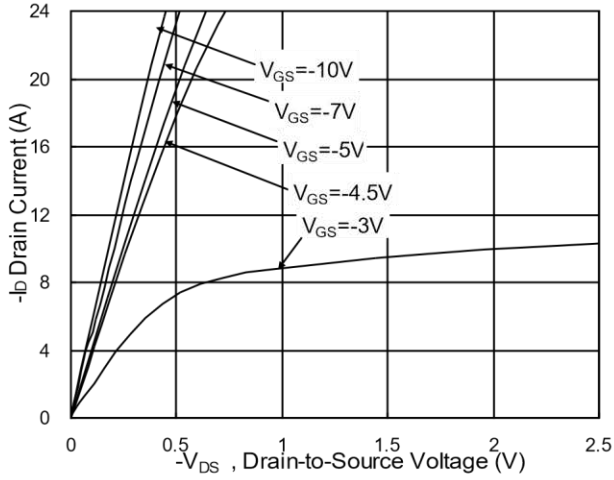


Fig.1 Typical Output Characteristics

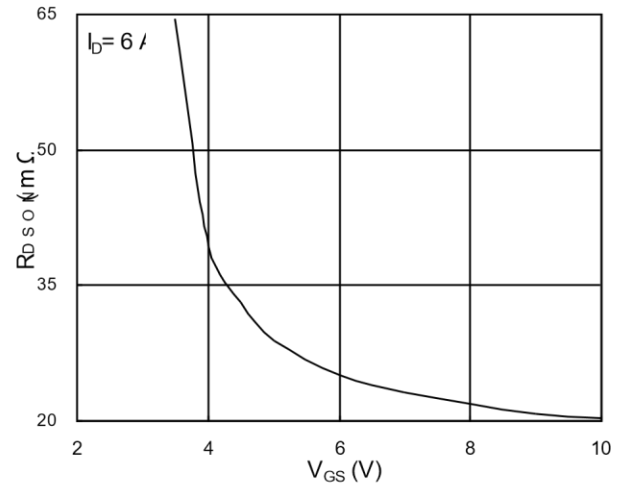


Fig.2 On-Resistance vs. Gate-Source

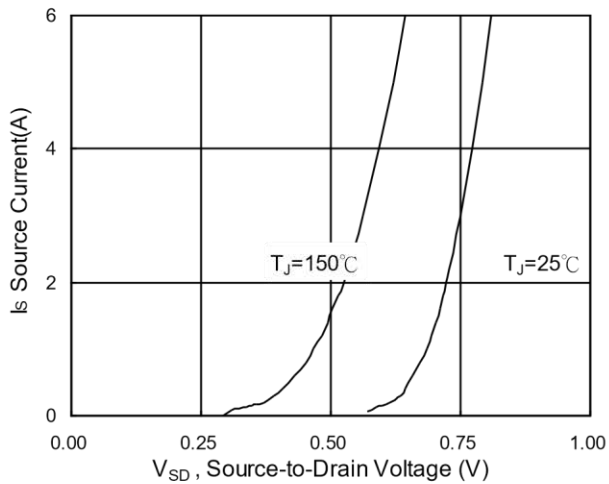


Fig.3 Forward Characteristics Of Reverse

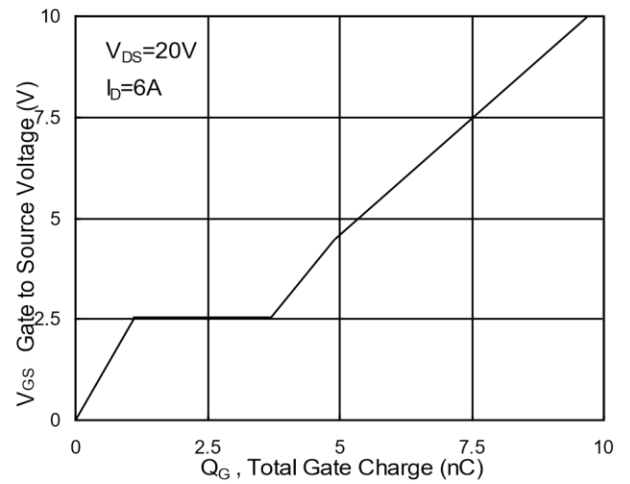


Fig.4 Gate-Charge Characteristics

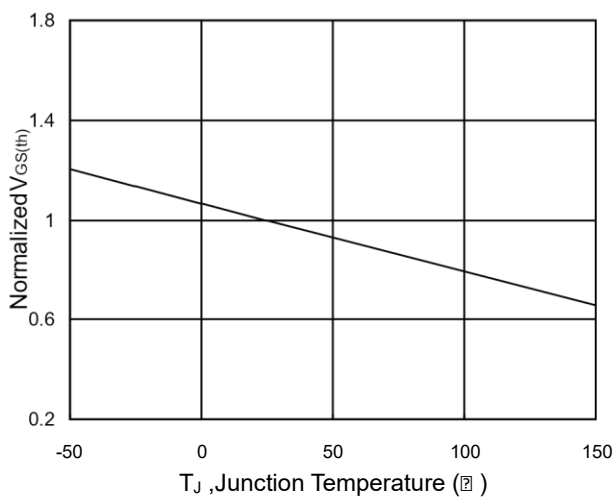


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

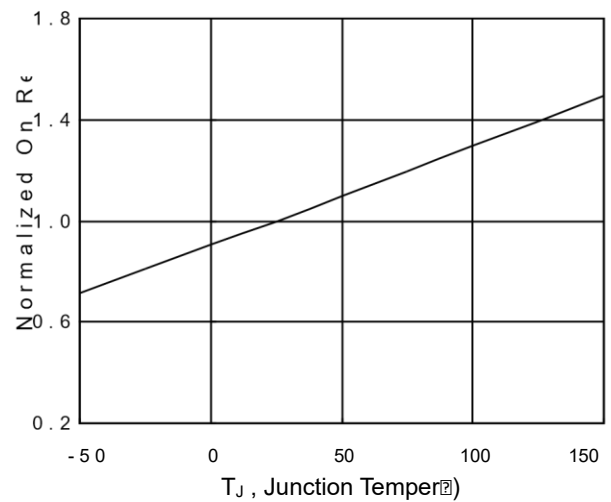


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

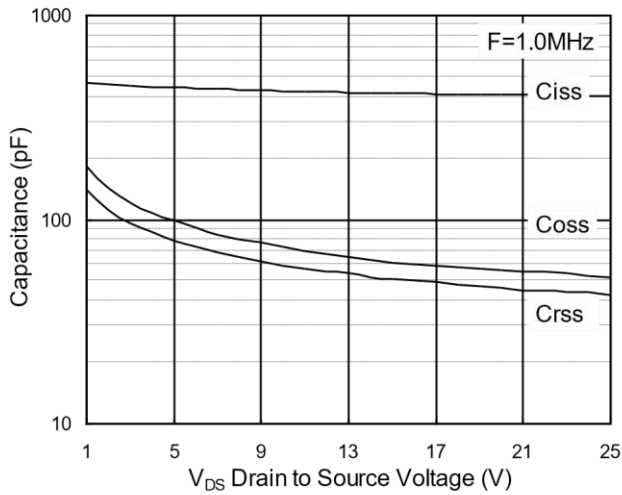


Fig.7 Capacitance

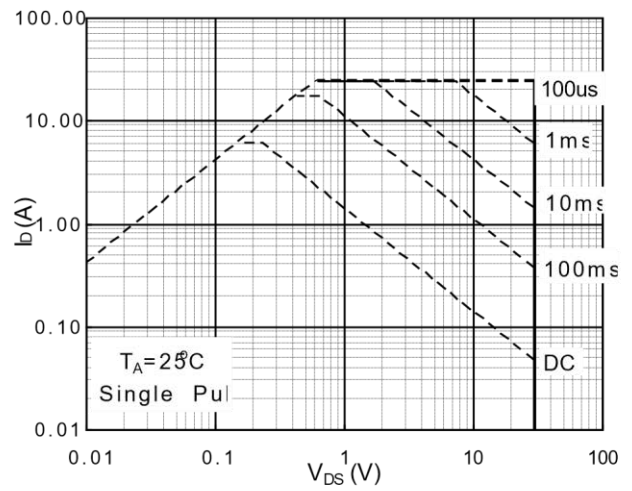


Fig.8 Safe Operating Area

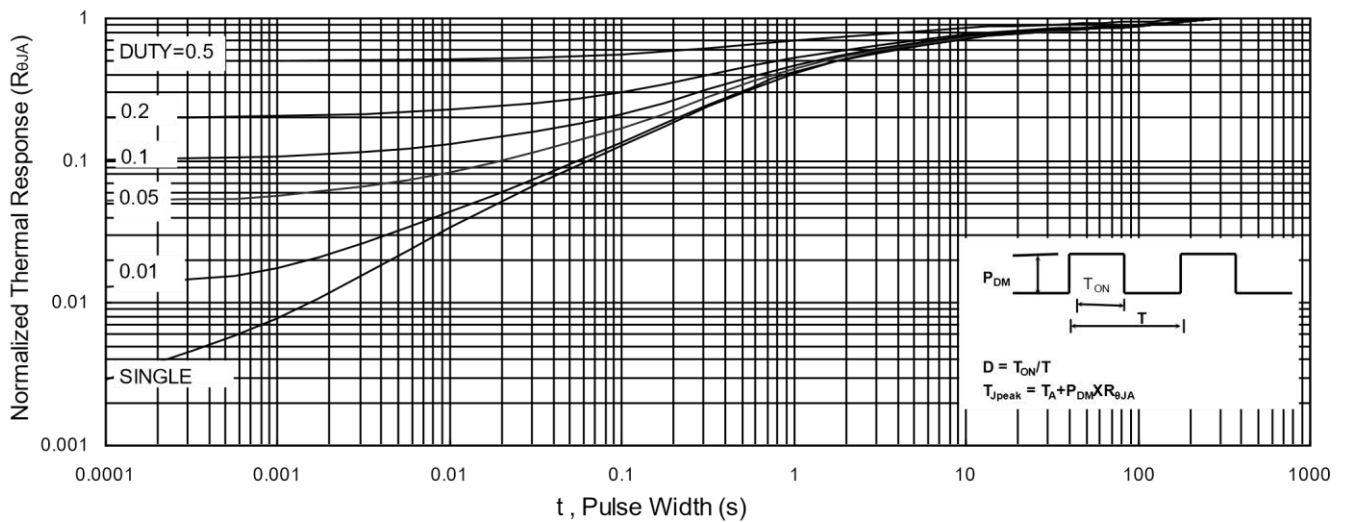


Fig.9 Normalized Maximum Transient Thermal Impedance

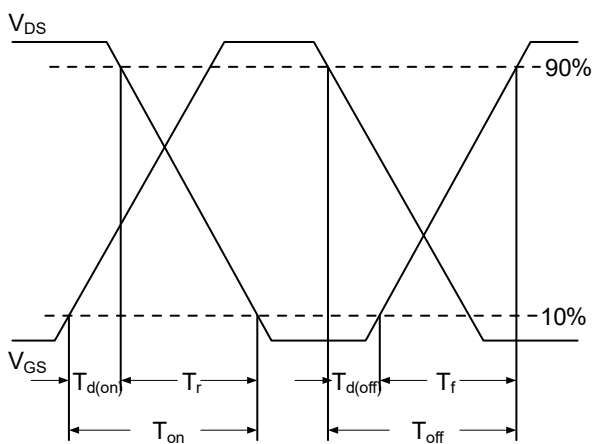


Fig.10 Switching Time Waveform

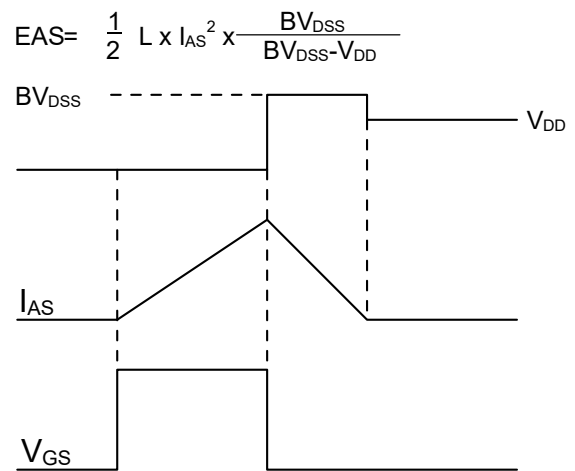


Fig.11 Unclamped Inductive Switching Waveform

P-Channel Typical Characteristics

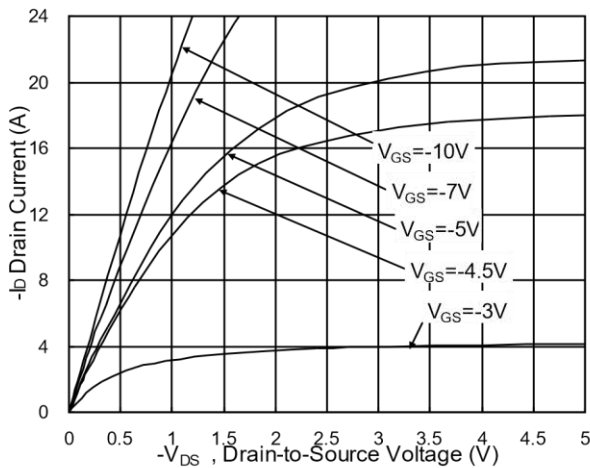


Fig.1 Typical Output Characteristics

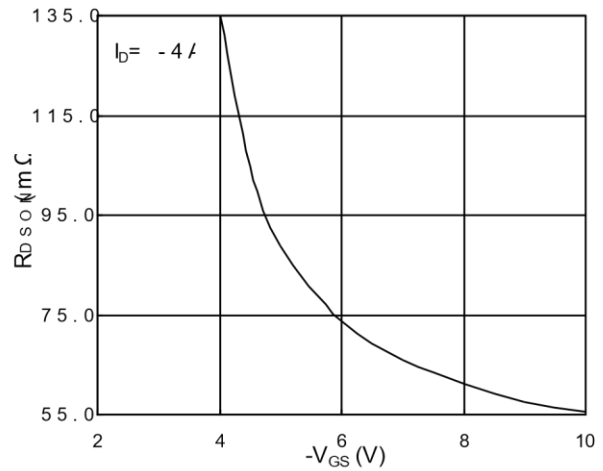


Fig.2 On-Resistance vs. G-S Voltage

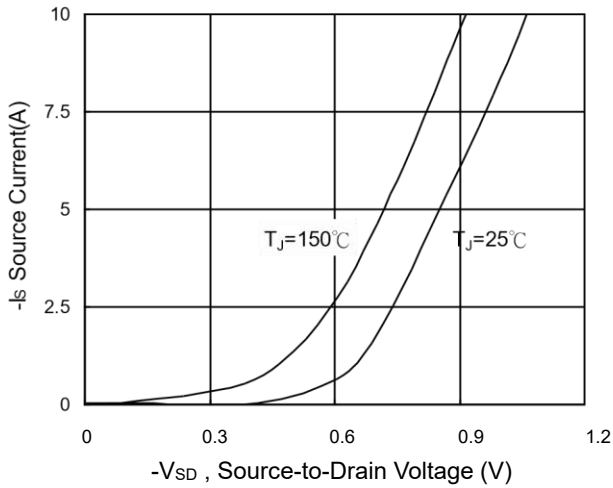


Fig.3 Forward Characteristics of Reverse

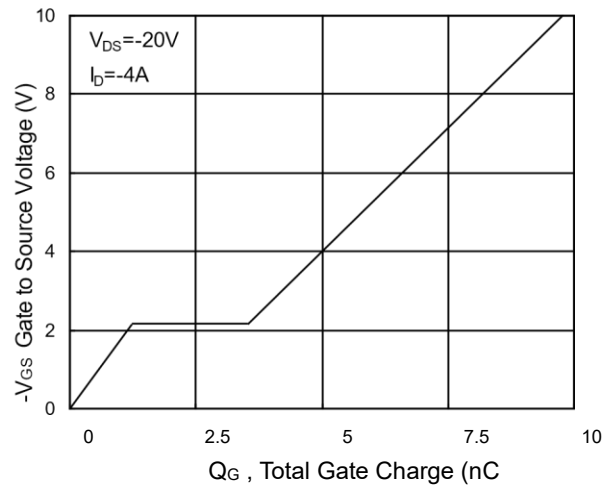


Fig.4 Gate-Charge Characteristics

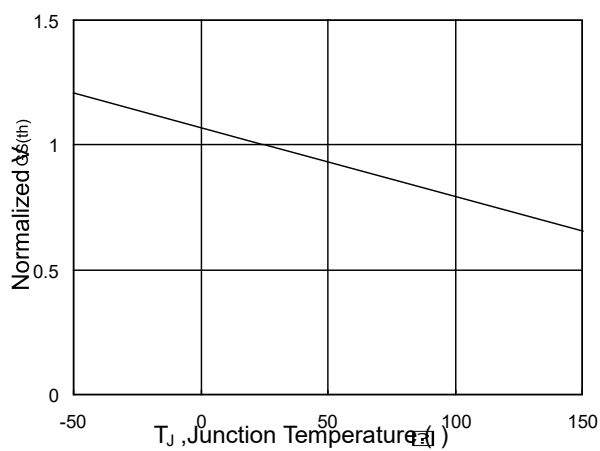


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

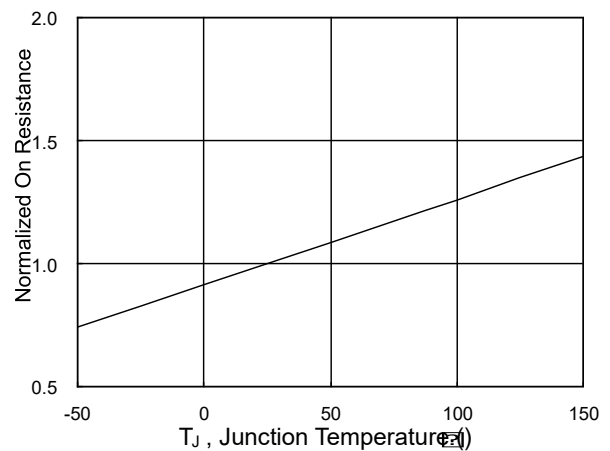


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

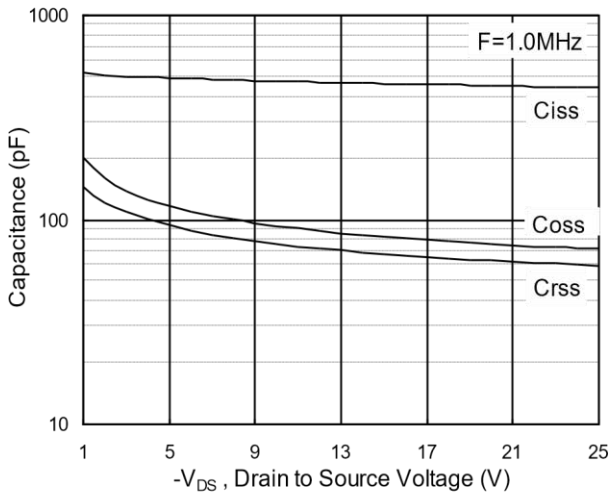


Fig.7 Capacitance

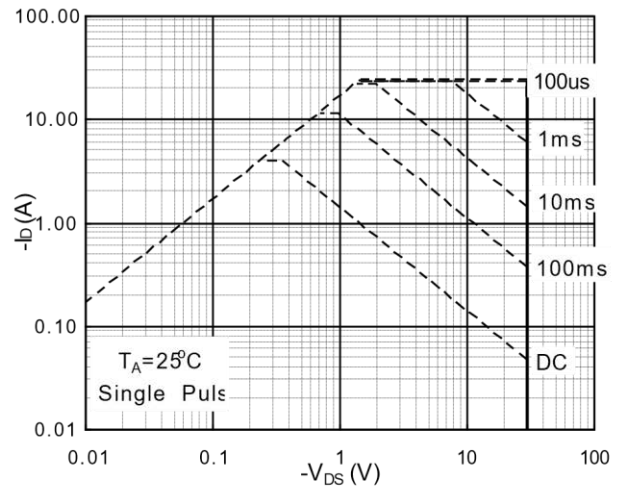


Fig.8 Safe Operating Area

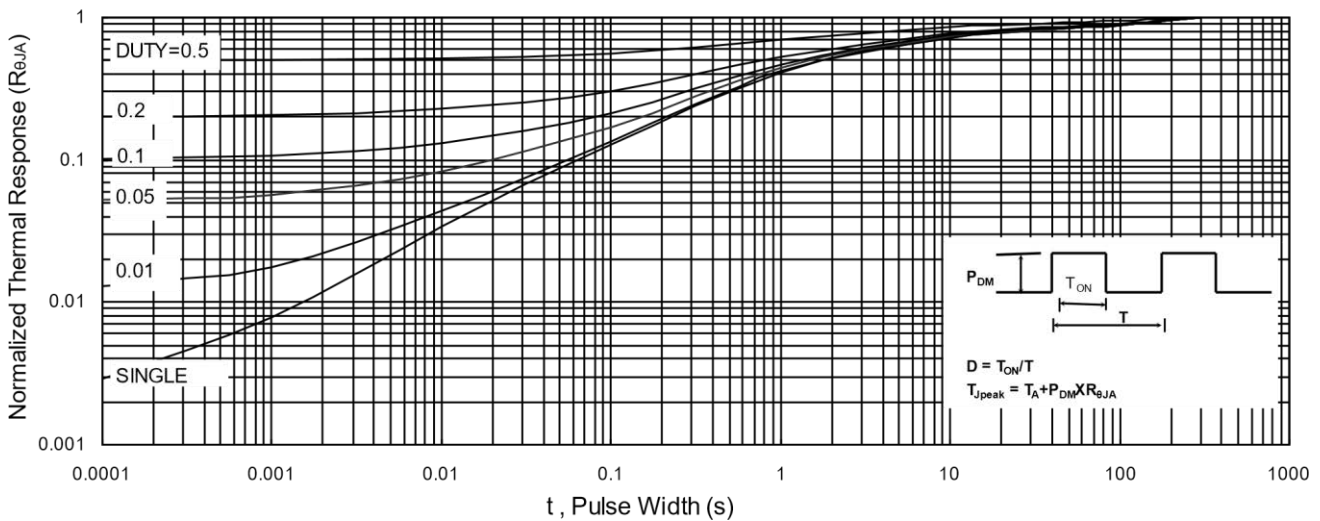


Fig.9 Normalized Maximum Transient Thermal Impedance

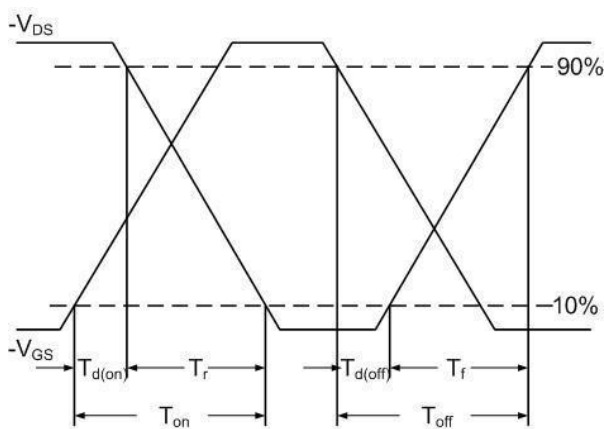


Fig.10 Switching Time Waveform

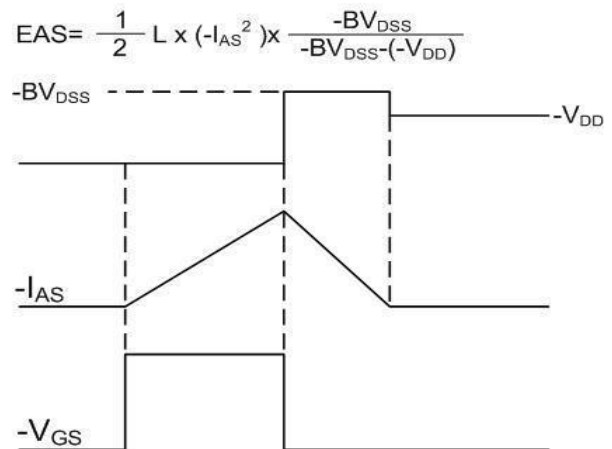
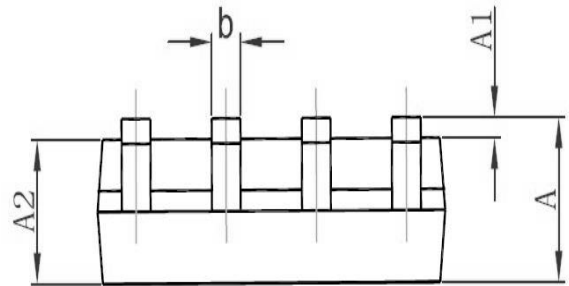
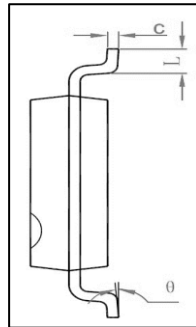
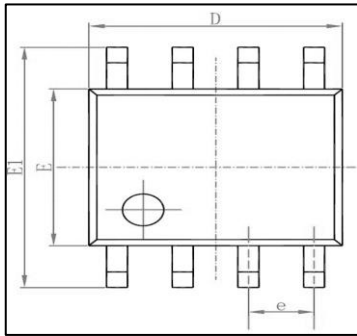
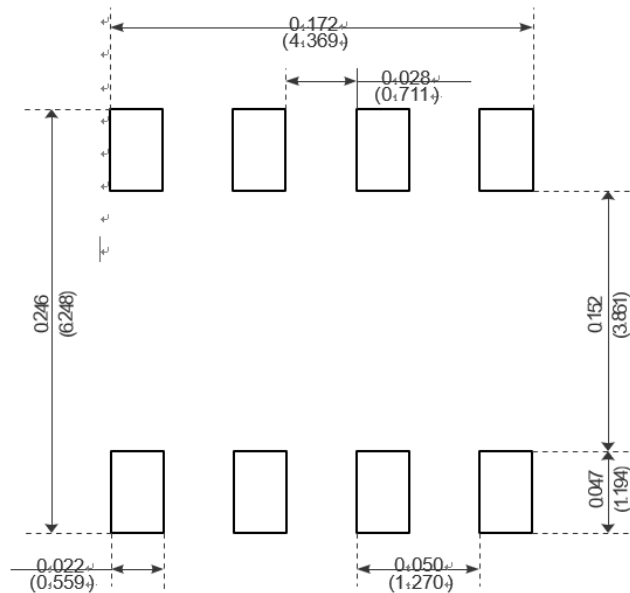


Fig.11 Unclamped Inductive Switching Waveform

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Recommended Minimum Pads

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 Tel : +86- 021 50828806
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