

Description:

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

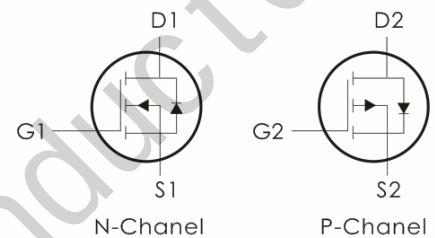
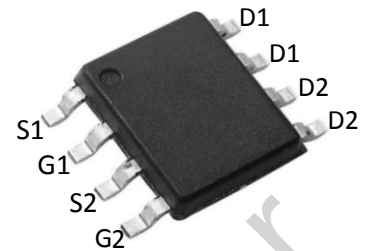
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=100V, I_D=2.2A, R_{DS(on)} < 120m\Omega @ V_{GS}=10V$

P-Channel: $V_{DS}=-100V, I_D=-1.8A, R_{DS(on)} < 200m\Omega @ V_{GS}=-10V$

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 4) Excellent package for good heat dissipation.



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

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	100	-100	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current- $T_A=25^\circ\text{C}$	2.2	-1.8	A
	Continuous Drain Current- $T_A=70^\circ\text{C}$	1.7	-1.4	
I_{DM}	Pulsed Drain Current ¹	13.2	-7.2	A
P_D	Power Dissipation	1.5	2	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ\text{C}$

Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	85	62.5	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case	25	---	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourtce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	100	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =80V, T _J =25 °C	---	---	10	μ A
		V _{GS} =0V, V _{DS} =80V, T _J =55 °C	---	---	100	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	---	2.5	V
R _{DS(ON)}	Drain-Source On Resistance ²	V _{GS} =10V, I _D =2A	---	86	120	m Ω
		V _{GS} =4.5V, I _D =1A	---	96	140	
G _{FS}	Forward Transconductance	V _{DS} =5V, I _D =2A	---	10.2	---	S
R _G	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	2.1	---	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	1050	---	pF
C _{oss}	Output Capacitance		---	45	---	
C _{rss}	Reverse Transfer Capacitance		---	30	---	
Q _g	Gate Charge	V _{GS} =10V , V _{DS} =80V I _D =2A	---	18.4	---	nC
Q _{gs}	Gate-Source Charge		---	3	---	
Q _{gd}	Gate-Drain Charge		---	3.1	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} =50V , V _{GS} =10V , R _G =3.3, I _D =2A	---	5.6	---	ns
t _r	Rise Time		---	20	---	ns
t _{d(off)}	Turn-Off Delay Time		---	28	---	ns
t _f	Fall Time		---	24	---	ns

Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1.2	V
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	2.2	ns
I_{SM}	Pulsed Source Current ^{2,4}		---	---	13.2	nC

N-Channel Typical Characteristics: ($T_C=25^\circ C$ unless otherwise noted)

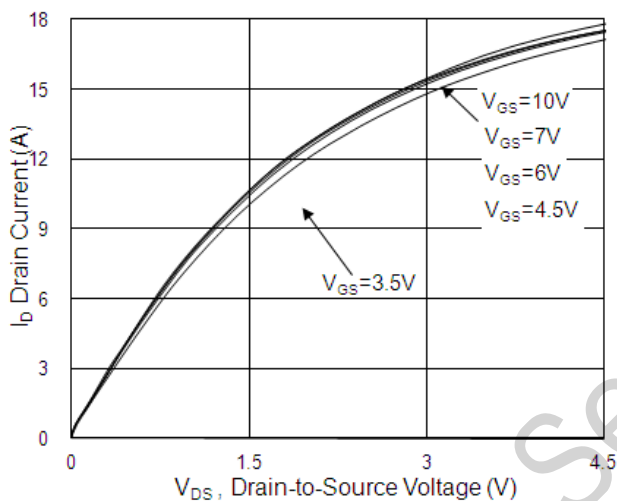


Fig.1 Typical Output Characteristics

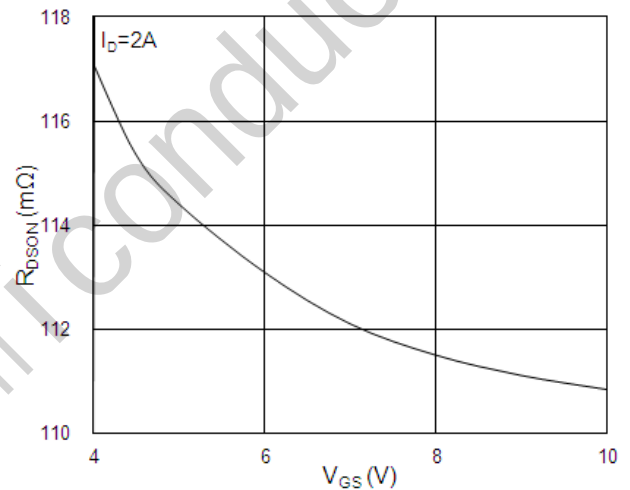


Fig.2 On-Resistance vs. Gate-Source

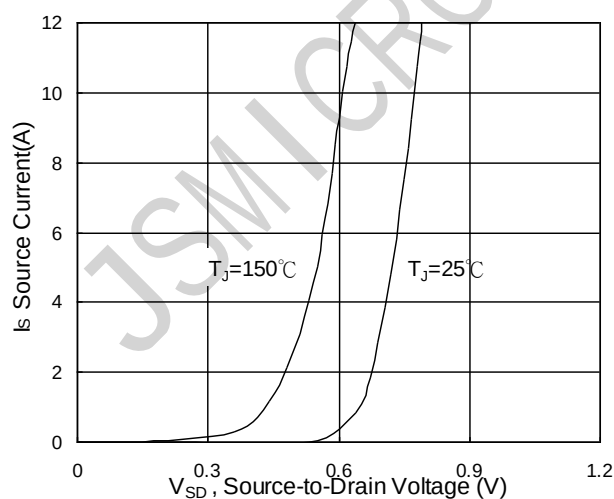


Fig.3 Forward Characteristics Of Reverse

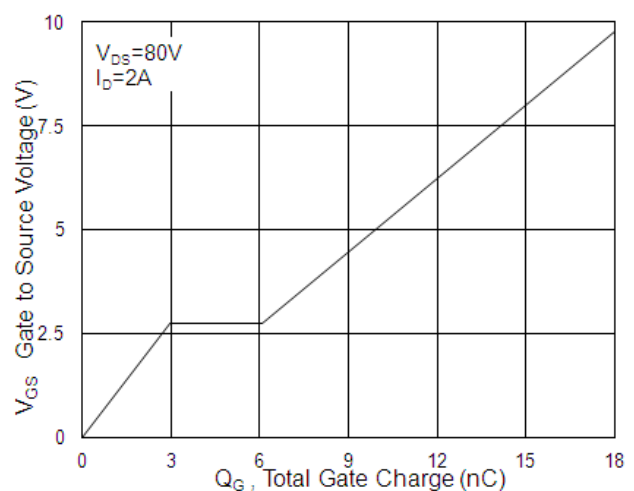
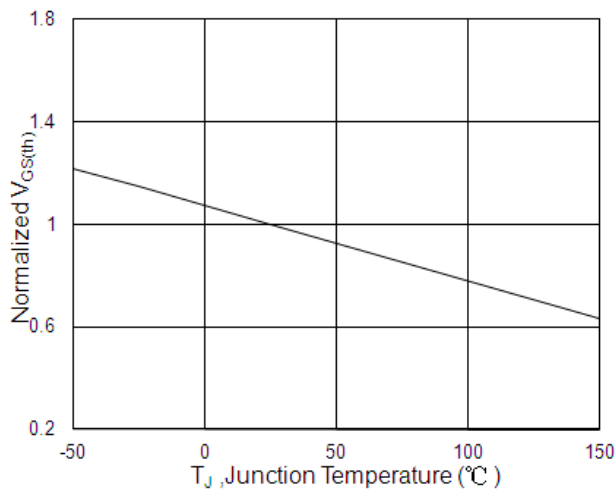
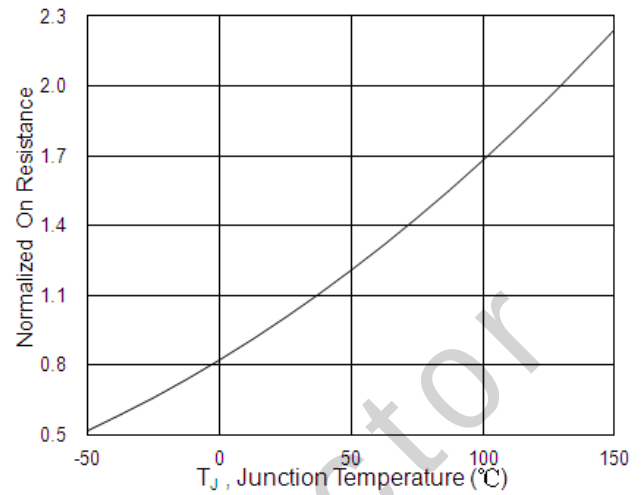
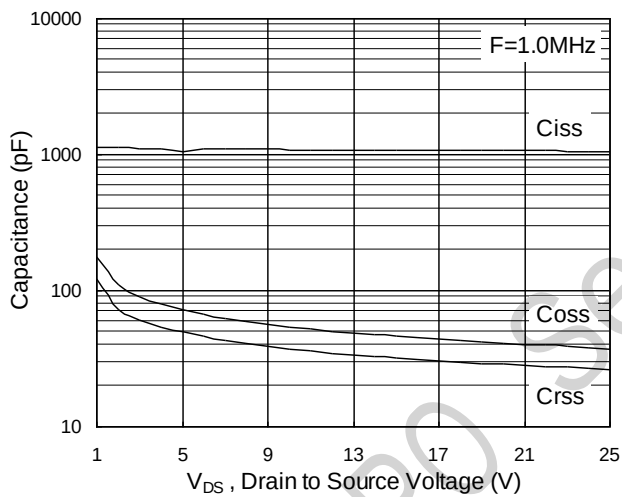
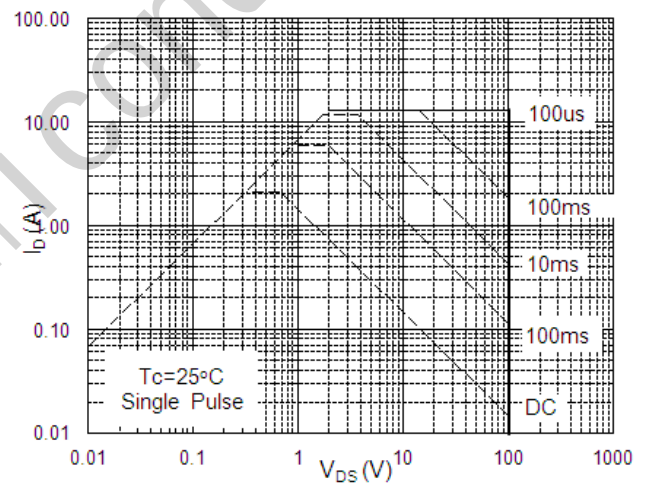
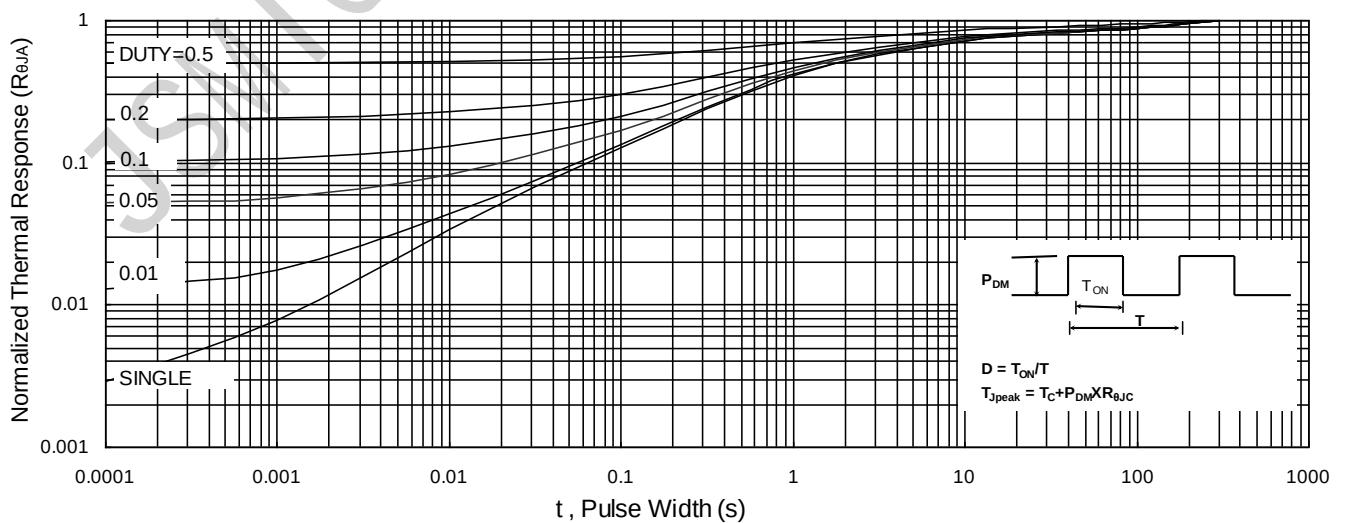
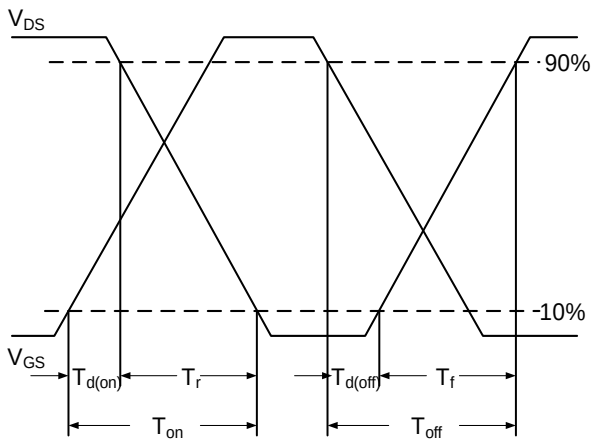
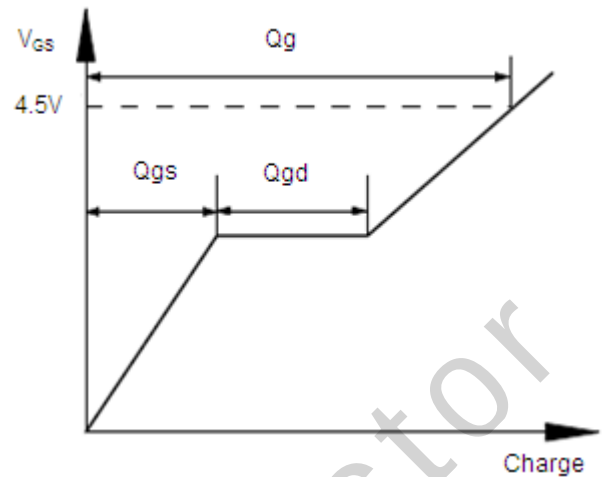


Fig.4 Gate-Charge Characteristics


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


Fig.10 Switching Time Waveform

Fig.11 Gate Charge Waveform
P-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu A$	-100	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-100V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{GS}=0V, V_{DS}=-80V, T_J=125^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu A$	-1.2	-1.6	-2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS}=-10V, I_D=-1.8A$	---	180	200	m Ω
		$V_{GS}=-4.5V, I_D=-1.5A$	---	190	225	
G_{FS}	Forward Transconductance	$V_{DS}=-10V, I_D=-3A$	---	6.5	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-50V, V_{GS}=0V, f=1\text{MHz}$	---	1455	2200	pF
C_{oss}	Output Capacitance		---	880	1300	
C_{rss}	Reverse Transfer Capacitance		---	58	85	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	16	---	Ω

Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{GS}=-10V, V_{DD}=-50V$ $R_G=25\ \Omega ,I_D=-1.8A$	---	18	36	ns
t_r	Rise Time ^{2,3}		---	8	16	ns
$t_{d(off)}$	Turn-Off Delay Time ^{2,3}		---	100	200	ns
t_f	Fall Time ^{2,3}		---	30	60	ns
Q_g	Total Gate Charge ^{2,3}	$V_{GS}=-10V, V_{DS}=-80V, I_D=-1.8A$	---	20	40	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	3.5	7	nC
Q_{gd}	Gate-Drain Charge ^{2,3}		---	4.6	9	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ C$	---	---	-1	V
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-1.8	V
I_{SM}	Pulsed Source Current		---	---	-3.6	V
T_{rr}	Reverse Recovery Time	$V_R=-100V, I_S=-1A$	---	13	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\ \mu s, T_J=25^\circ C$	---	15	---	nC

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

P-Channel Typical Characteristics: ($T_C=25^\circ C$ unless otherwise noted)

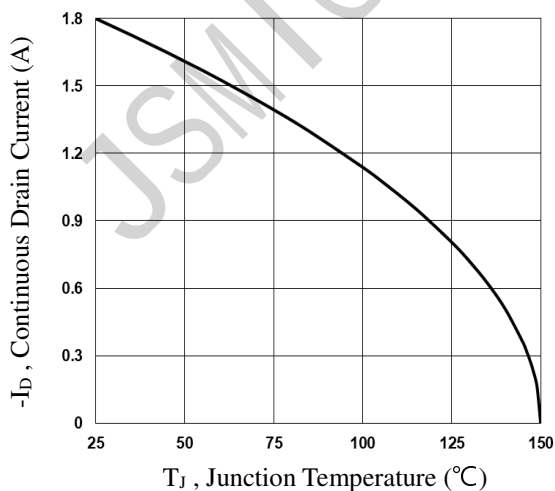


Fig.1 Continuous Drain Current vs. T_J

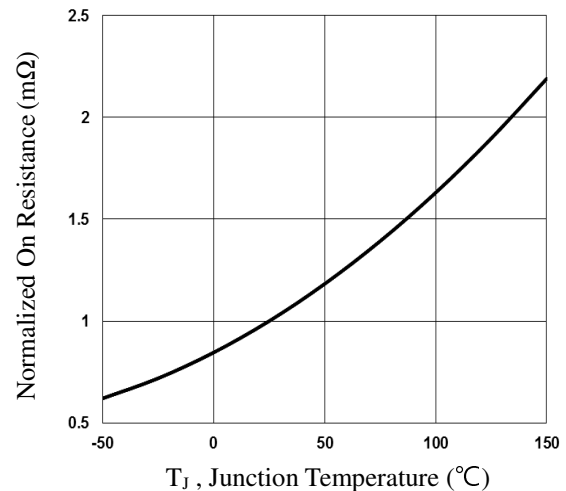
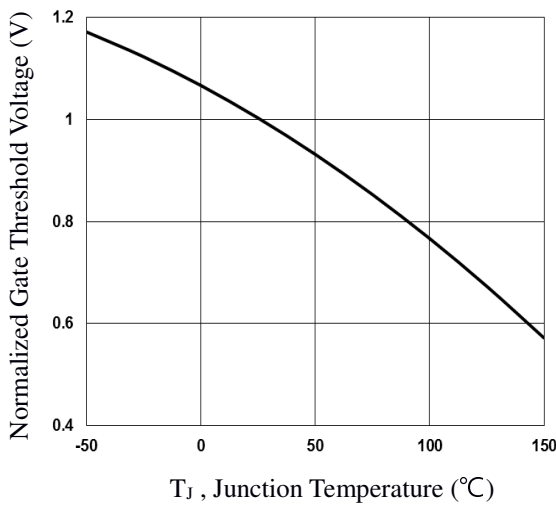
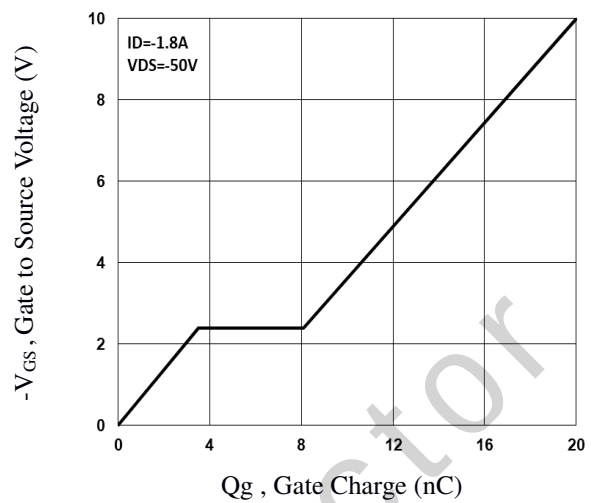
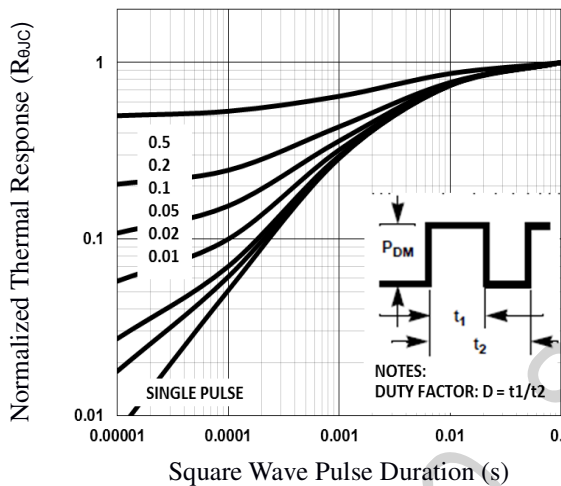
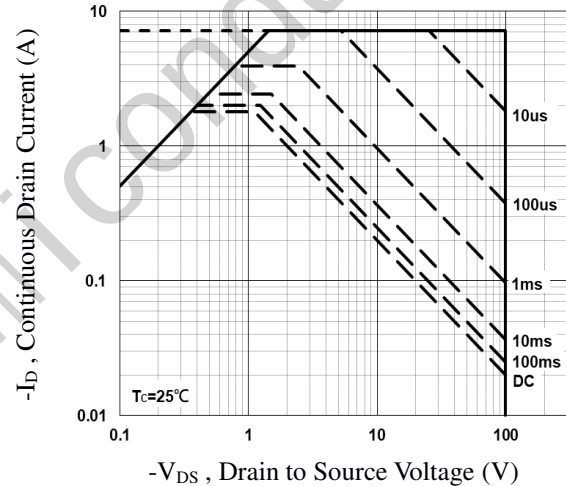
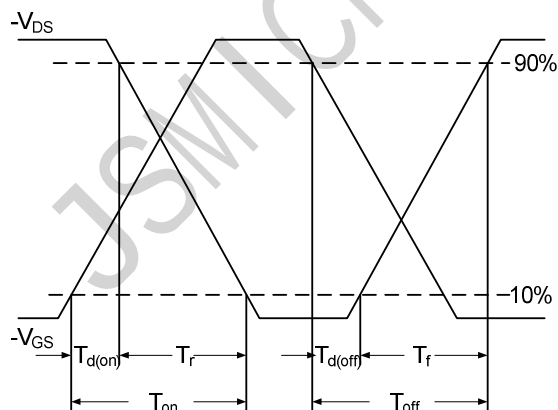
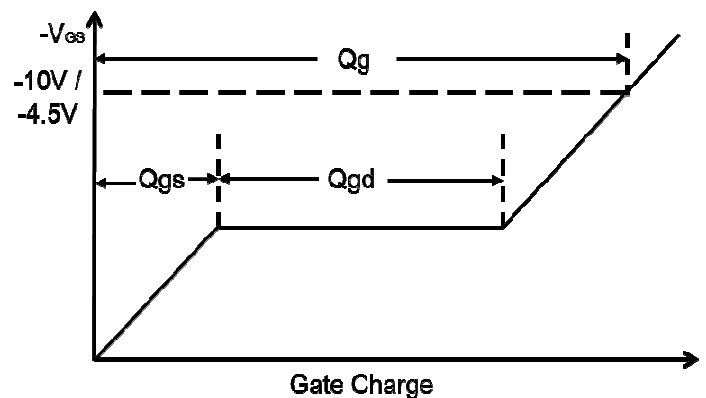
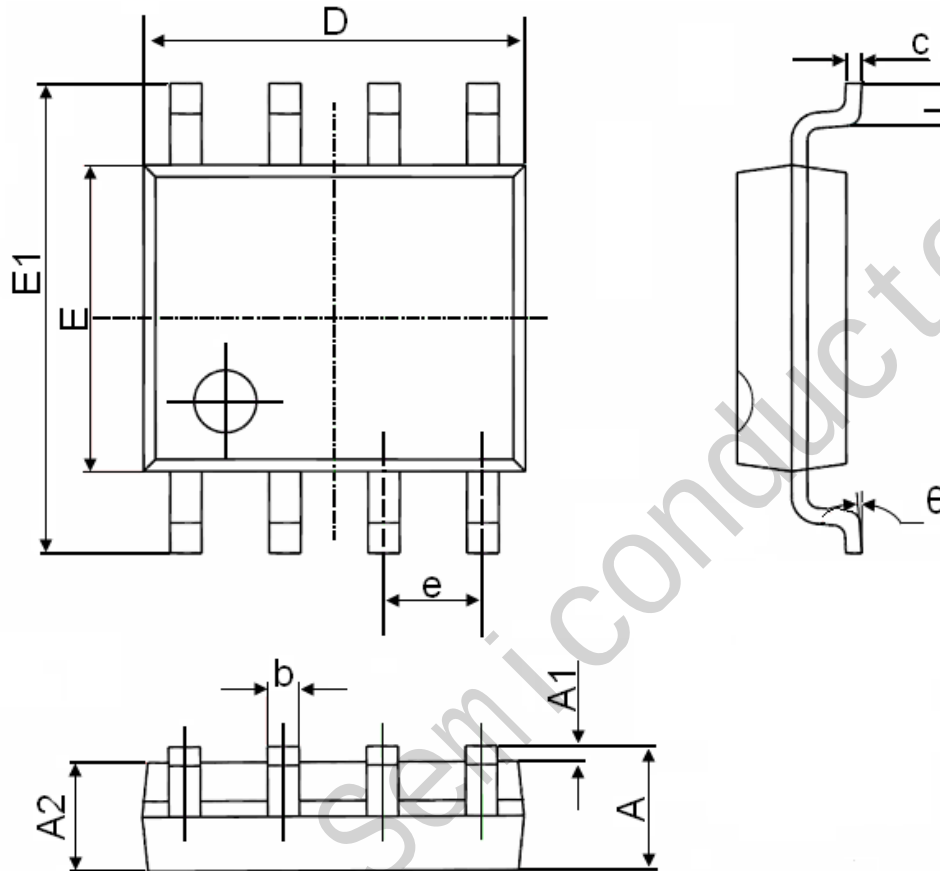


Fig.2 Normalized $R_{DS(on)}$ vs. T_J


Fig.3 Normalized V_{th} vs. T_J

Fig.4 Gate Charge Waveform

Fig.5 Normalized Transient Impedance

Fig.6 Maximum Safe Operation Area

Fig.7 Switching Time Waveform

Fig.8 Gate Charge 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°