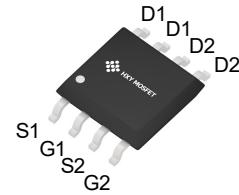




## Description

The HXY10G10S 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.



SOP-8

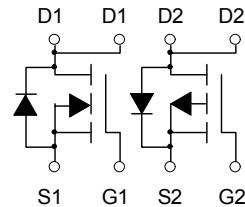
## General Features

$V_{DS} = 100V$   $I_D = 10A$

$R_{DS(ON)} < 90m\Omega$  @  $V_{GS}=10V$

$V_{DS} = -100V$   $I_D = -5A$

$R_{DS(ON)} < 220m\Omega$  @  $V_{GS}=-10V$



N-Channel and P-Channel

## Application

Wireless charging

Boost driver

Brushless motor

## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
HXY10G10S	SOP-8	HXY MOSFET	3000

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

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
$V_{DS}$	Drain-Source Voltage	100	-100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	10	-5	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	6	-3.5	A
$Idm$	Pulsed Drain Current	25	-35.3	A
$EAS$	Single Pulse Avalanche Energy	22.5	35.3	mJ
$P_D@T_A=25^\circ C$	Total Power Dissipation	2.5	2.5	W
$T_{STG}$	Storage Temperature Range	-55 to 150	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C
$R_{JA}$	Thermal Resistance Junction-Ambient	85		°C/W
$R_{JC}$	Thermal Resistance Junction-Case	62.5		°C/W



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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = 250\mu\text{A}$	100	-	-	V
Gate-body Leakage current	$I_{\text{GSS}}$	$V_{\text{DS}} = 0\text{V}, V_{\text{GS}} = \pm 20\text{V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current $T_J=25^\circ\text{C}$	$I_{\text{DSS}}$	$V_{\text{DS}} = 100\text{V}, V_{\text{GS}} = 0\text{V}$	-	-	1	$\mu\text{A}$
$T_J=100^\circ\text{C}$			-	-	100	
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = 250\mu\text{A}$	1.2	-	2.5	V
Drain-Source on-Resistance <sup>4</sup>	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_{\text{D}} = 5\text{A}$	-	65	90	$\text{m}\Omega$
		$V_{\text{GS}} = 4.5\text{V}, I_{\text{D}} = 3\text{A}$	-	75	105	
Forward Transconductance <sup>4</sup>	$g_{\text{fs}}$	$V_{\text{DS}} = 5\text{V}, I_{\text{D}} = 5\text{A}$	-	12	-	S
<b>Dynamic Characteristics<sup>5</sup></b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}} = 15\text{V}, V_{\text{GS}} = 0\text{V}, f = 1\text{MHz}$	-	1220	-	$\text{pF}$
Output Capacitance	$C_{\text{oss}}$		-	53	-	
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	42	-	
Gate Resistance	$R_g$	$f = 1\text{MHz}$	-	1.3	-	$\Omega$
<b>Switching Characteristics<sup>5</sup></b>						
Total Gate Charge	$Q_g$	$V_{\text{GS}} = 10\text{V}, V_{\text{DS}} = 50\text{V}, I_{\text{D}} = 5\text{A}$	-	20.6	-	$\text{nC}$
Gate-Source Charge	$Q_{\text{gs}}$		-	4	-	
Gate-Drain Charge	$Q_{\text{gd}}$		-	3.7	-	
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, V_{\text{DD}} = 50\text{V}, R_G = 3\Omega, I_{\text{D}} = 5\text{A}$	-	4.7	-	$\text{ns}$
Rise Time	$t_r$		-	21	-	
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	20	-	
Fall Time	$t_f$		-	16	-	
<b>Drain-Source Body Diode Characteristics</b>						
Diode Forward Voltage <sup>4</sup>	$V_{\text{SD}}$	$I_{\text{S}} = 1\text{A}, V_{\text{GS}} = 0\text{V}$	-	-	1.2	V
Continuous Source Current	$T_c = 25^\circ\text{C}$	$I_{\text{S}}$	-	-	10	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(\text{MAX})} = 150^\circ\text{C}$ .
2. The data tested by pulsed, pulse width  $\leq 300\text{us}$ , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is  $V_{\text{DD}} = 25\text{V}, V_{\text{GS}} = 10\text{V}, L = 0.1\text{mH}, I_{\text{AS}} = 8\text{A}$
4. The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
5. The data is theoretically the same as  $I_{\text{D}}$  and  $I_{\text{DM}}$ , in real applications, should be limited by total power dissipation.



**P-Channel Electrical Characteristics (T<sub>J</sub>=25 °C ,unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	$V_G=0V$ , $I_D=-250\mu A$	-100	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V$ , $I_D=-3A$	---	180	220	$m\Omega$
		$V_{GS}=-4.5V$ , $I_D=-2A$	---	210	255	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$ , $I_D=-250\mu A$	-1.2	---	-2.5	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-80V$ , $V_{GS}=0V$ , $T_J=25^\circ C$	---	---	-1	$\mu A$
		$V_{DS}=-80V$ , $V_{GS}=0V$ , $T_J=85^\circ C$	---	---	-30	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	---	---	$\pm 100$	nA
$R_g$	Gate Resistance	$V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$	---	13	---	$\Omega$
$Q_g$	Total Gate Charge (-10V)	$V_{DS}=-50V$ , $V_{GS}=-10V$ , $I_D=-2A$	---	19	---	$nC$
$Q_{gs}$	Gate-Source Charge		---	3.4	---	
$Q_{gd}$	Gate-Drain Charge		---	2.9	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-30V$ , $V_{GS}=-10V$ , $R_g=3.3\Omega$ , $I_D=-1A$	---	9	---	$ns$
$T_r$	Rise Time		---	6	---	
$T_{d(off)}$	Turn-Off Delay Time		---	39	---	
$T_f$	Fall Time		---	33	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-30V$ , $V_{GS}=0V$ , $f=1MHz$	---	1228	---	$pF$
$C_{oss}$	Output Capacitance		---	41	---	
$C_{rss}$	Reverse Transfer Capacitance		---	29	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_s$	Continuous Source Current <sup>1,5</sup>	$V_G=V_D=0V$ , Force Current	---	---	-5.0	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V$ , $I_s=-1A$ , $T_J=25^\circ C$	---	---	-1.2	V

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup>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  $V_{DD}=-25V$ , $V_{GS}=-10V$ , $L=0.5mH$ , $I_{AS}=-14A$
- 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.



### N-Channel Typical Characteristics

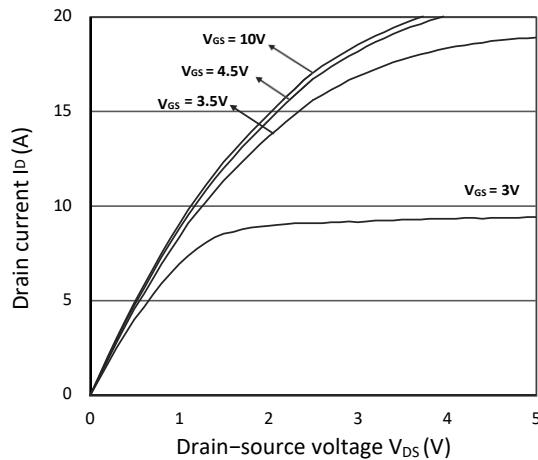


Figure 1. Output Characteristics

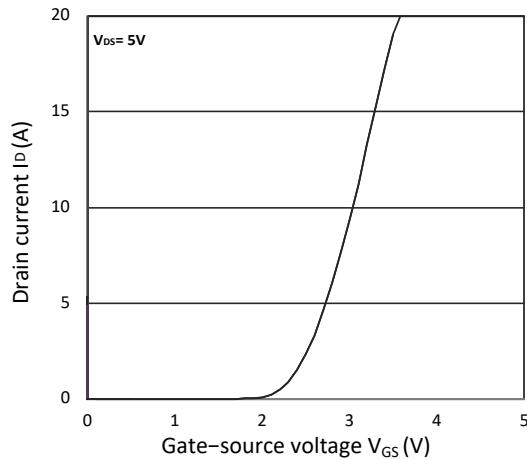


Figure 2. Transfer Characteristics

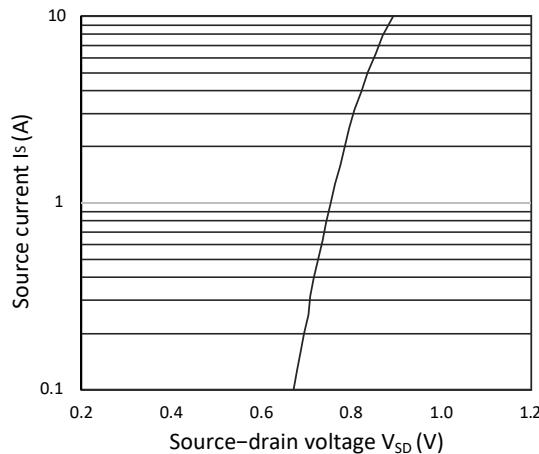


Figure 3. Forward Characteristics of Reverse

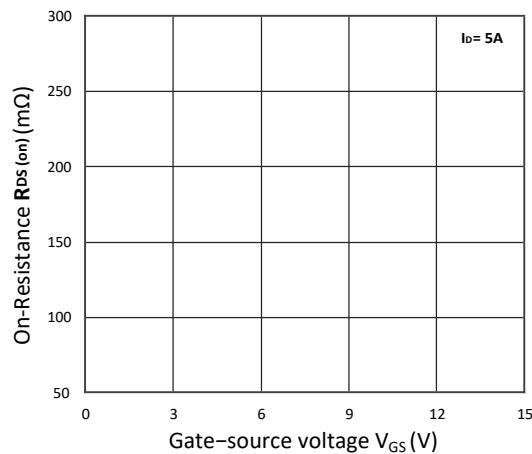


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

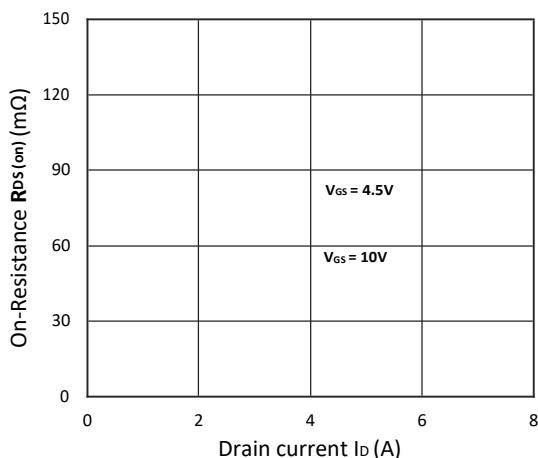


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

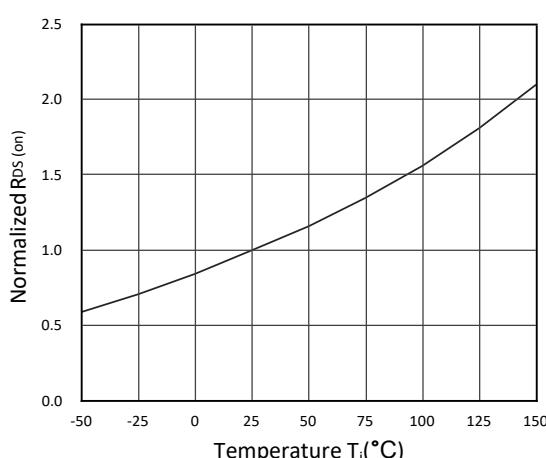


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

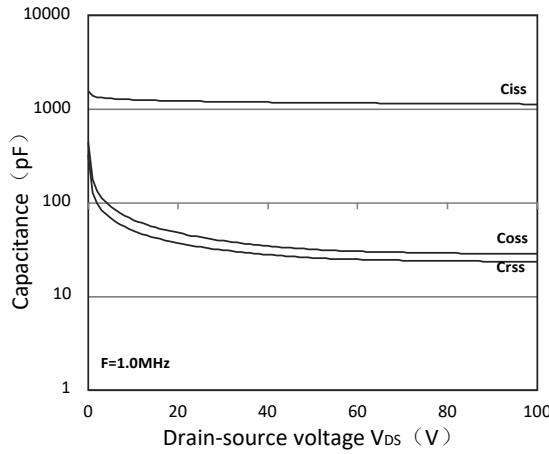


Figure 7. Capacitance Characteristics

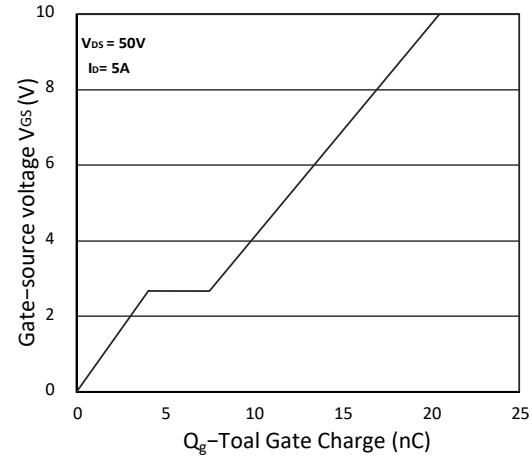


Figure 8. Gate Charge Characteristics

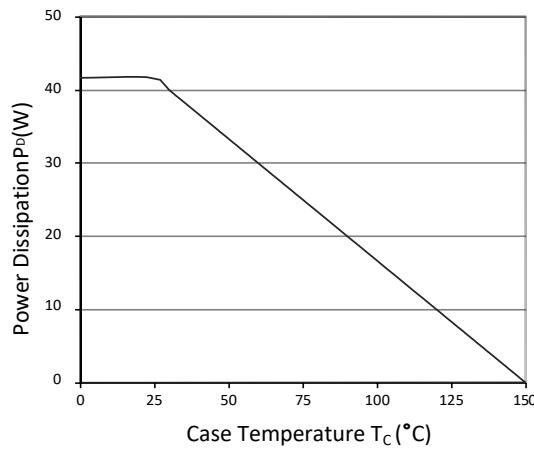


Figure 9. Power Dissipation

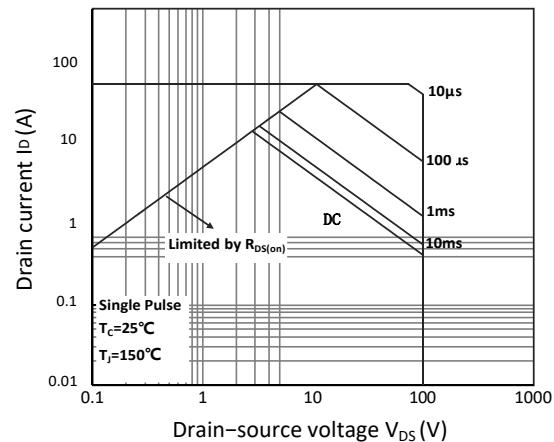


Figure 10. Safe Operating Area

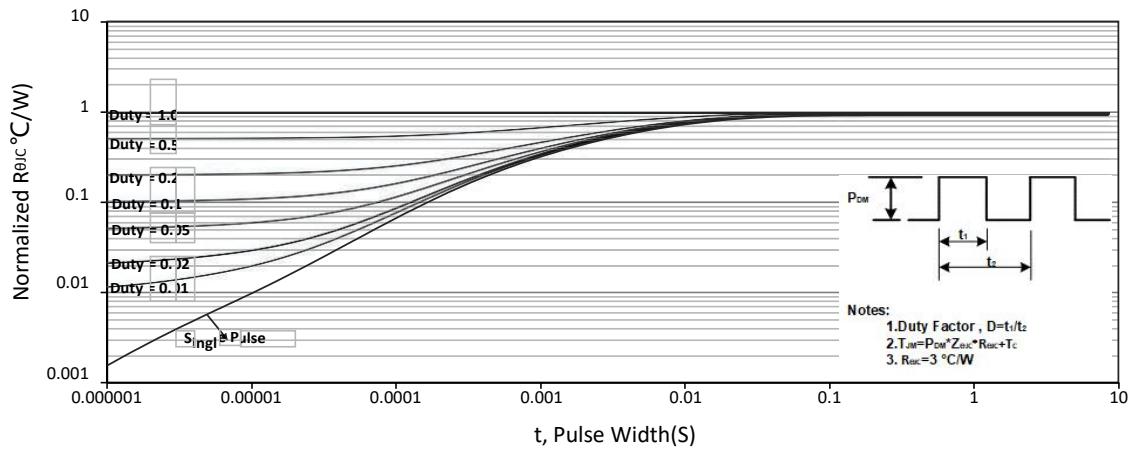
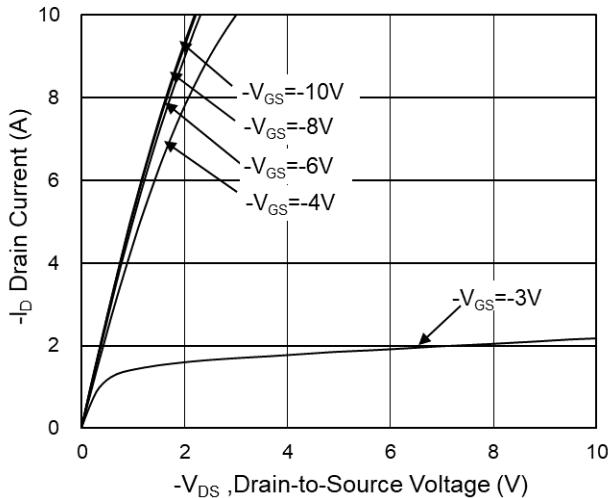


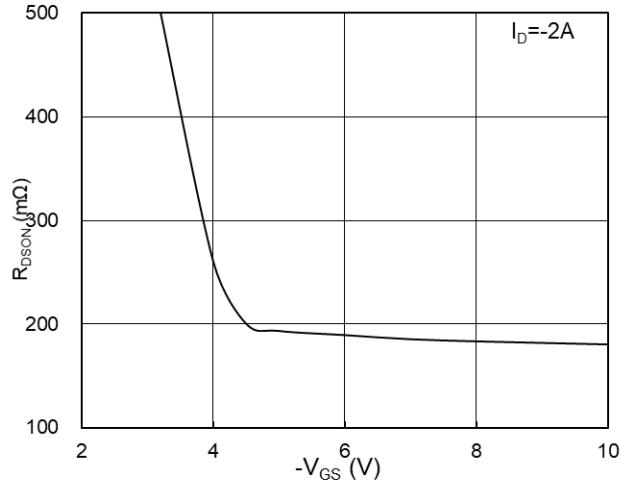
Figure 11. Normalized Maximum Transient Thermal Impedance



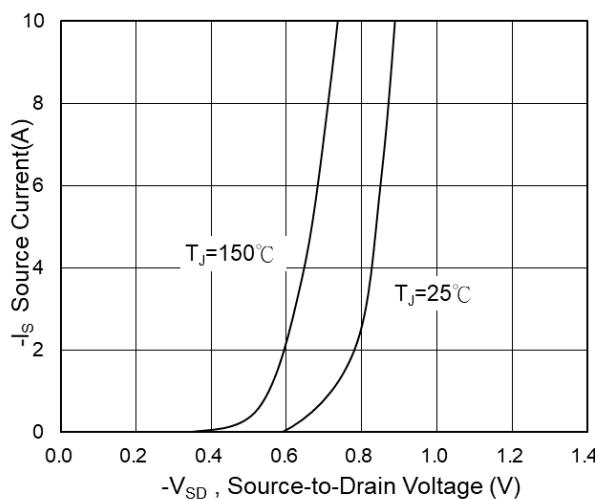
### P-Channel Typical Characteristics



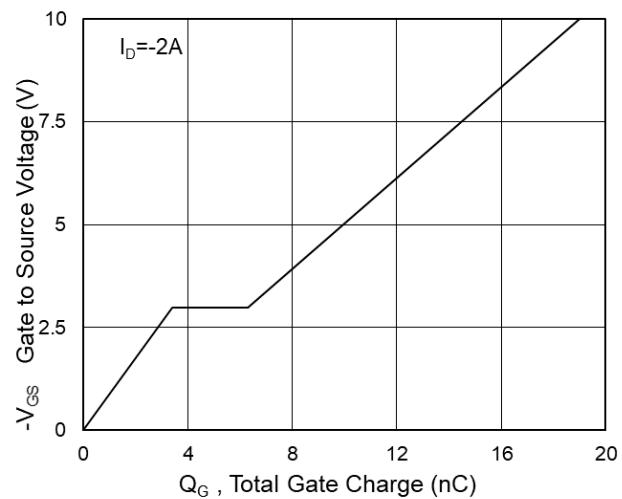
**Fig.1 Typical Output Characteristics**



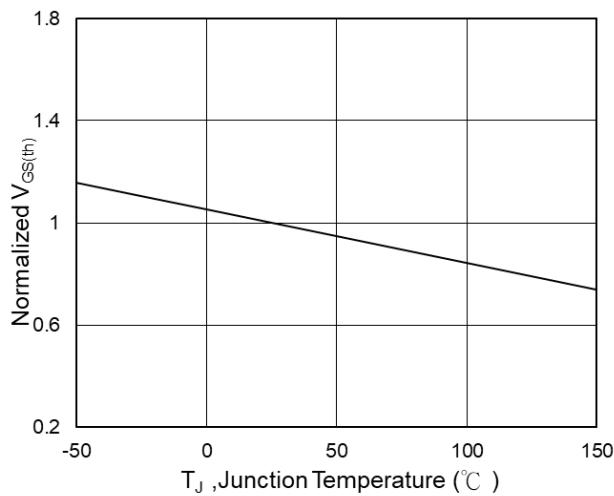
**Fig.2 On-Resistance vs G-S Voltage**



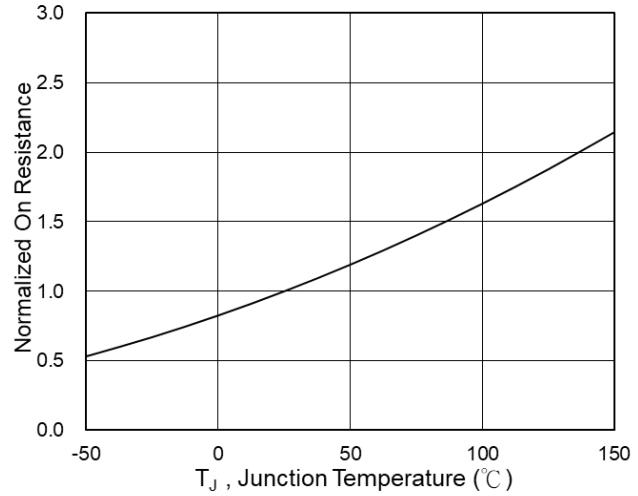
**Fig.3 Source Drain Forward Characteristics**



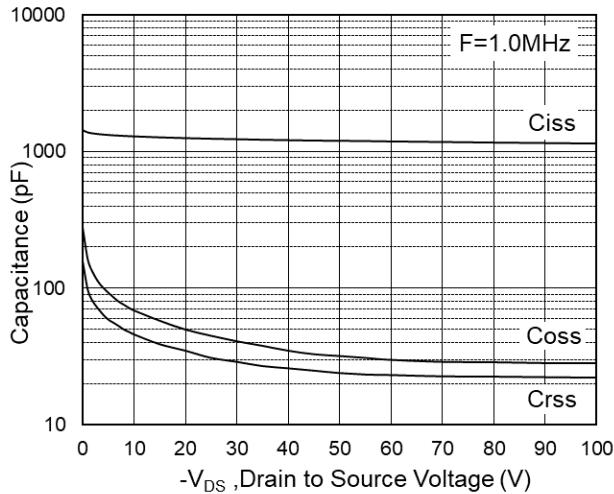
**Fig.4 Gate-Charge Characteristics**



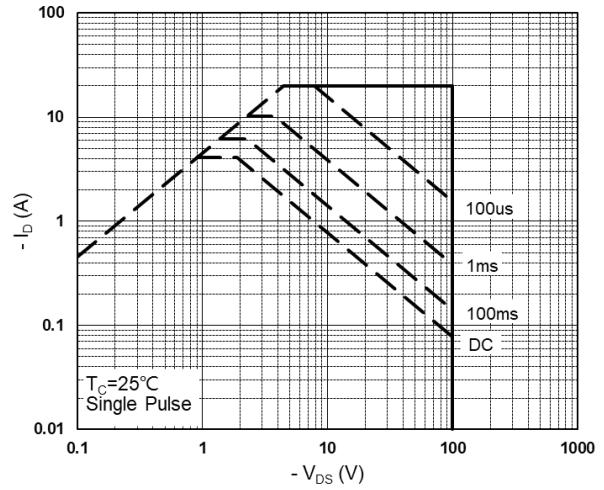
**Fig.5 Normalized V\_GS(th) vs T\_J**



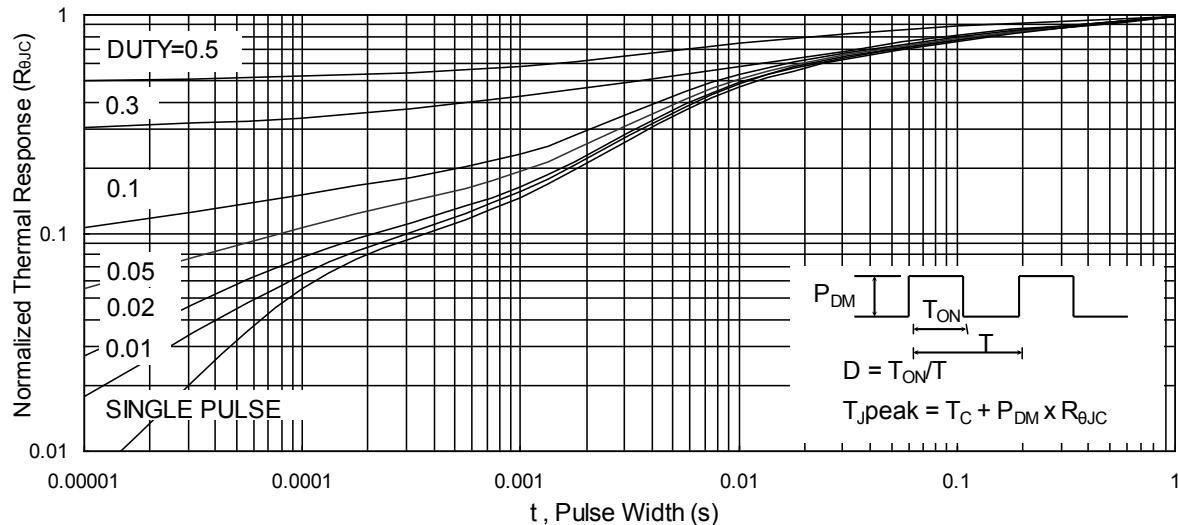
**Fig.6 Normalized R\_DS(on) vs T\_J**



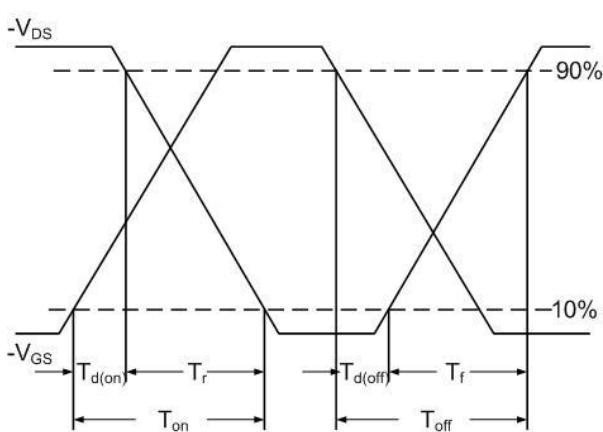
**Fig.7 Capacitance**



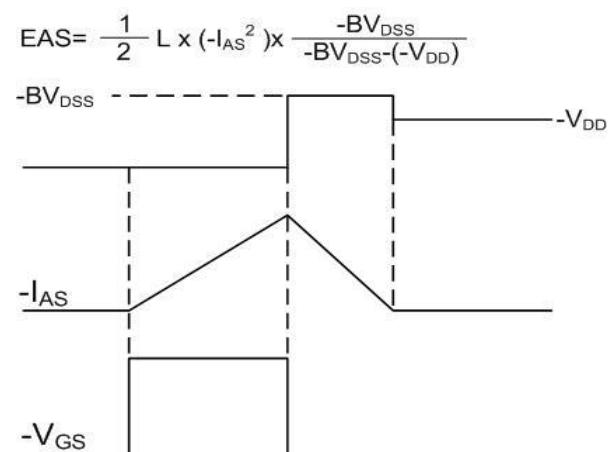
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



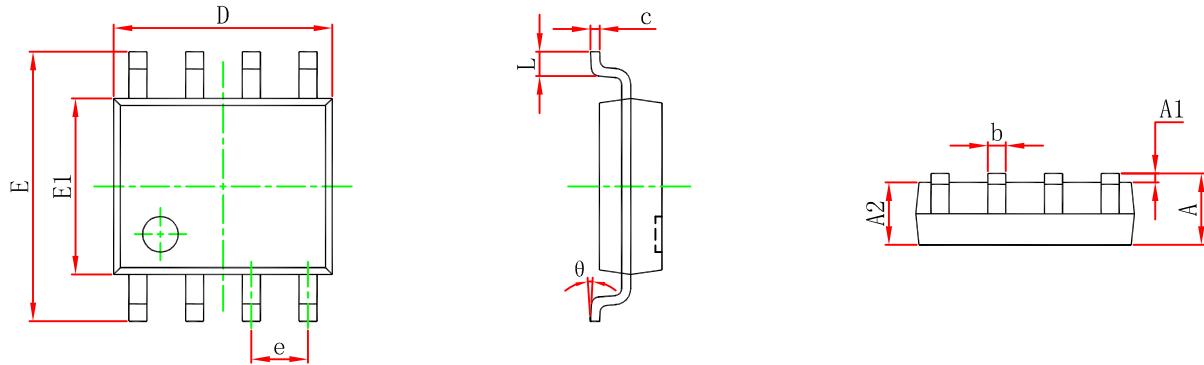
**Fig.10 Switching Time Waveform**



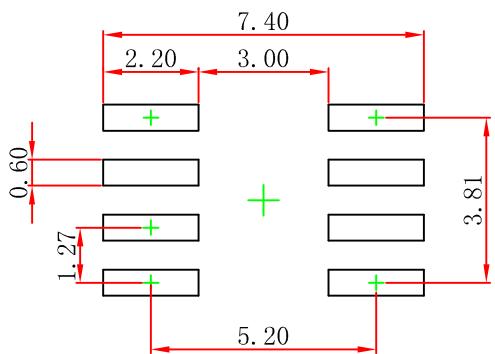
**Fig.11 Unclamped Inductive Waveform**



### SOP-8 Package Outline Dimensions



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	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05$ mm.  
3. The pad layout is for reference purposes only.



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