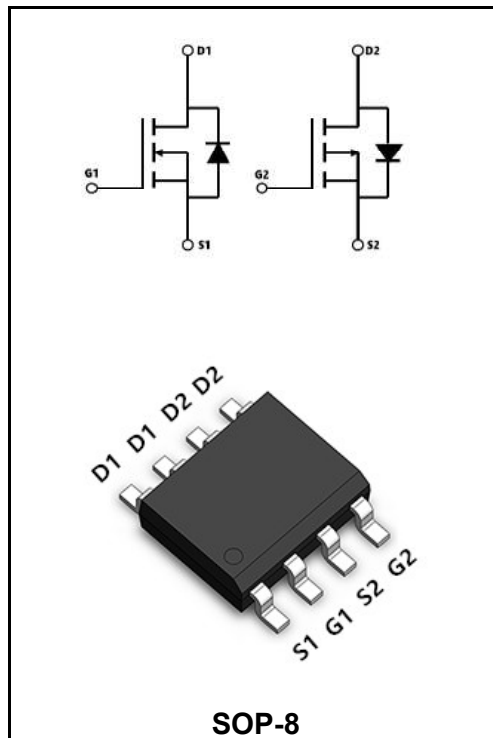


40V N+P-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

I_D	9.8A
V_{DSS}	40V
$R_{DS(on)-typ}(@V_{GS}=10V)$	< 26mΩ (Type: 17.5 mΩ)
I_D	-7.5A
V_{DSS}	-40V
$R_{DS(on)-typ}(@V_{GS}=-10V)$	< 45mΩ (Type: 38 mΩ)



Application

- ◆ Wireless charging
- ◆ Boost driver
- ◆ Brushless motor

Maximum Ratings at $T_c=25^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbols	Value		Units
		N-Ch	P-Ch	
Drain-Source Voltage	V_{DS}	40	-40	V
Gate - Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current, $V_{GS} @ 10V^1 @ T_A=25^{\circ}\text{C}$	I_D	9.8	-7.5	A
Continuous Drain Current, $V_{GS} @ 10V^1 @ T_A=70^{\circ}\text{C}$	I_D	5.2	-4.8	A
Pulsed Drain Current ²	I_{DM}	23	-22	A
Single Pulse Avalanche Energy ³	E_{AS}	16.2	39	mJ
Avalanche Current	I_{AS}	18	-28	A
Total Power Dissipation ⁴ @ $T_A=25^{\circ}\text{C}$	P_D	1.67	1.67	W
Storage Temperature Range	T_{STG}	-55 to +150		$^{\circ}\text{C}$
Operating Junction Temperature Range	T_J	-55 to +150		$^{\circ}\text{C}$
Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	75		$^{\circ}\text{C/W}$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	30		$^{\circ}\text{C/W}$

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	BV_{DSS}	40	44	-	V
BVDSS Temperature Coefficient	Reference to 25 °C, I _D =1mA	ΔBV_{DSS}/ΔT_J	-	0.034	-	V/°C
Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =5A	R_{DS(ON)}	-	17.5	26	mΩ
	V _{GS} =4.5V, I _D =4A		-	25.0	35	
Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	V_{GS(th)}	1.0	1.6	2.5	V
V _{GS(th)} Temperature Coefficient		ΔV_{GS(th)}	-	-4.56	-	mV/°C
Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V, T _J =25 °C	I_{DSS}	-	-	1	uA
	V _{DS} =32V, V _{GS} =0V, T _J =55 °C		-	-	5	
Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V _{DS} = 5V, I _D = 5A	g_{fs}	-	14	-	S
Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	R_g	-	2.6	-	Ω
Total Gate Charge(4.5V)	V _{DS} =20V V _{GS} =4.5V I _D =5A	Q_g	-	5.5	-	nC
Gate-Source Charge		Q_{gs}	-	1.25	-	
Gate-Drain Charge		Q_{gd}	-	2.5	-	
Turn-on delay time	V _{DD} =20V V _{GS} =10V R _G = 3.3Ω I _D = 1A	t_{d(on)}	-	8.9	-	ns
Rise Time		T_r	-	2.2	-	
Turn-Off Delay Time		t_{d(OFF)}	-	41	-	
Fall Time		t_f	-	2.7	-	
Input Capacitance	V _{DS} =15V V _{GS} =0V f=1MHz	C_{iss}	-	593	-	pF
Output Capacitance		C_{oss}	-	76	-	
Reverse Transfer Capacitance		C_{rss}	-	56	-	
Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	I_S	-	-	6.1	A
Pulsed Source Current ^{2,5}		I_{SM}	-	-	23	A
Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25 °C	V_{SD}	-	-	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}=10A
- 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.

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	BV _{DSS}	-40	-44	-	V
BVDSS Temperature Coefficient	Reference to 25°C, I _D =-1mA	ΔBV _{DSS} /ΔT _J	-	-0.02	-	V/°C
Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-6A	R _{DS(ON)}	-	38	45	mΩ
	V _{GS} =-4.5V, I _D =-3A		-	48	60	
Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	V _{GS(th)}	-1.0	-1.6	-2.5	V
V _{GS(th)} Temperature Coefficient		ΔV _{GS(th)}	-	3.72	-	mV/°C
Drain-Source Leakage Current	V _{DS} =-32V, V _{GS} =0V, T _J =25°C	I _{DSS}	-	-	1	uA
	V _{DS} =-32V, V _{GS} =0V, T _J =55°C		-	-	5	
Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	I _{GSS}	-	-	±100	nA
Forward Transconductance	V _{DS} = -5V, I _D = -6A	g _{fs}	-	13	-	S
Total Gate Charge(-4.5V)	V _{DS} =-20V V _{GS} =-4.5V I _D =-6A	Q _g	-	11.5	-	nC
Gate-Source Charge		Q _{gs}	-	3.5	-	
Gate-Drain Charge		Q _{gd}	-	3.3	-	
Turn-on delay time	V _{DD} =-15V V _{GS} =-10V R _G = 3.3Ω I _D =-1A	t _{d(on)}	-	22	-	ns
Rise Time		T _r	-	15.7	-	
Turn-Off Delay Time		t _{d(OFF)}	-	59	-	
Fall Time		t _f	-	5.5	-	
Input Capacitance	V _{DS} =-15V V _{GS} =0V f=1MHz	C _{iss}	-	1415	-	pF
Output Capacitance		C _{oss}	-	134	-	
Reverse Transfer Capacitance		C _{rss}	-	102	-	
Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	I _S	-	-	-6	A
Pulsed Source Current ^{2,5}		I _{SM}	-	-	-22	A
Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	V _{SD}	-	-	-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}=-10A
- 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

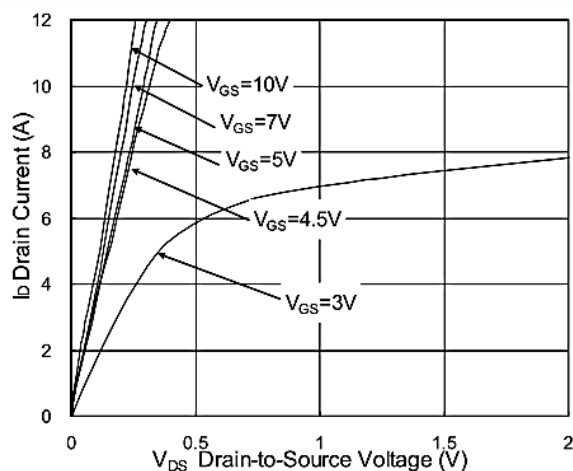


Fig.1 Typical Output Characteristics

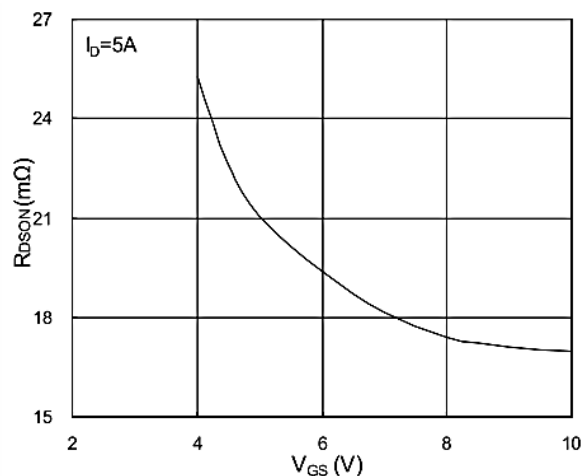


Fig.2 On-Resistance vs. G-S Voltage

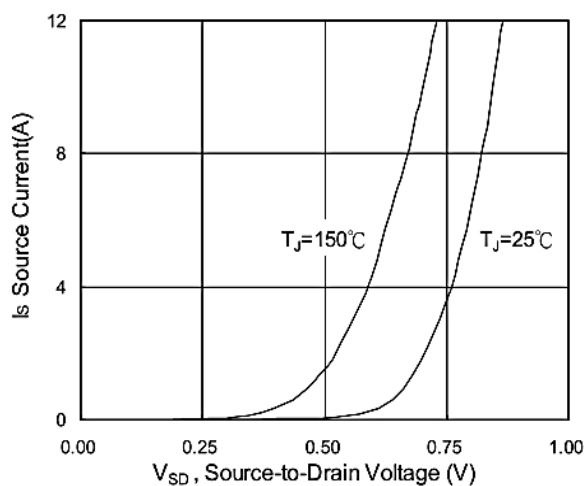


Fig.3 Source Drain Forward Characteristics

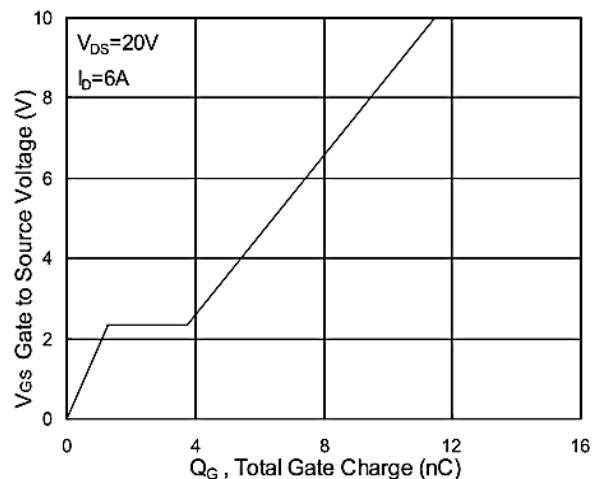


Fig.4 Gate-Charge Characteristics

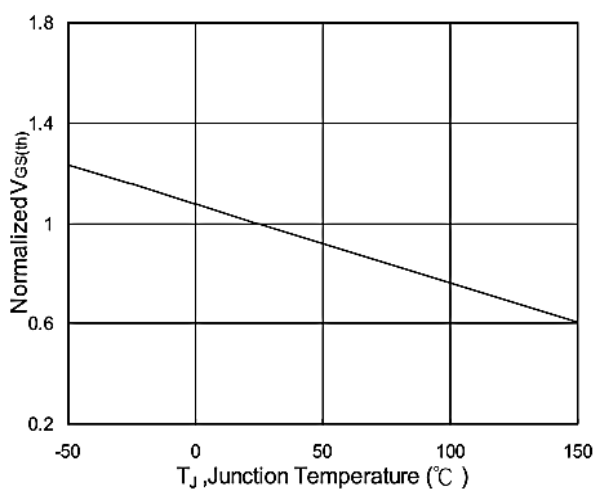


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

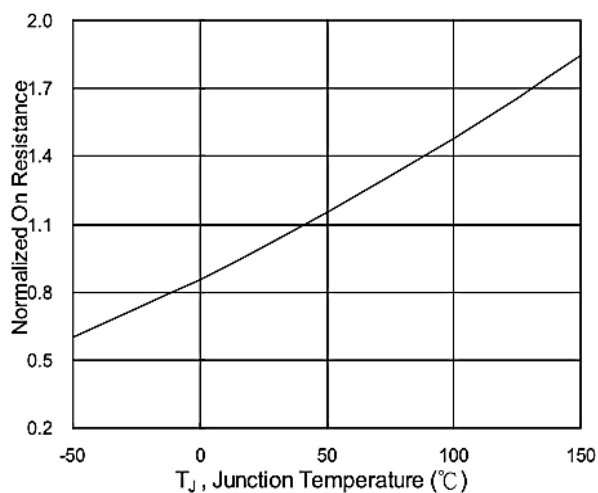


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Ratings and Characteristic Curves

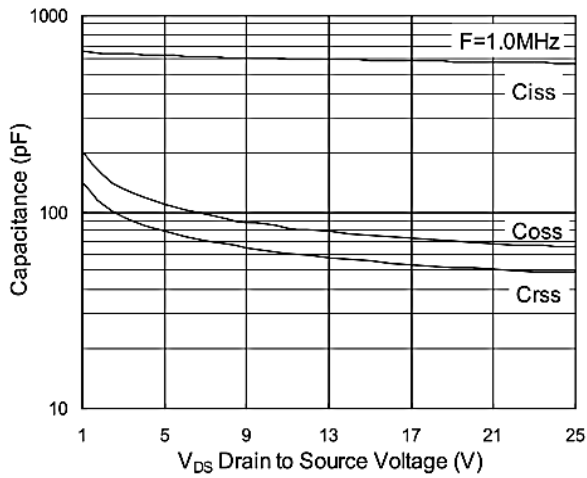


Fig.7 Capacitance

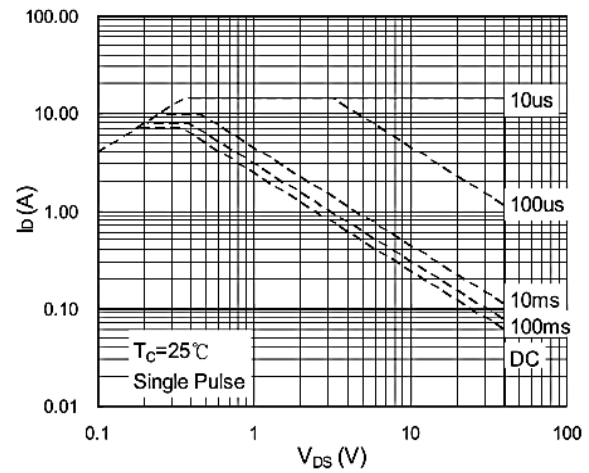


Fig.8 Safe Operating Area

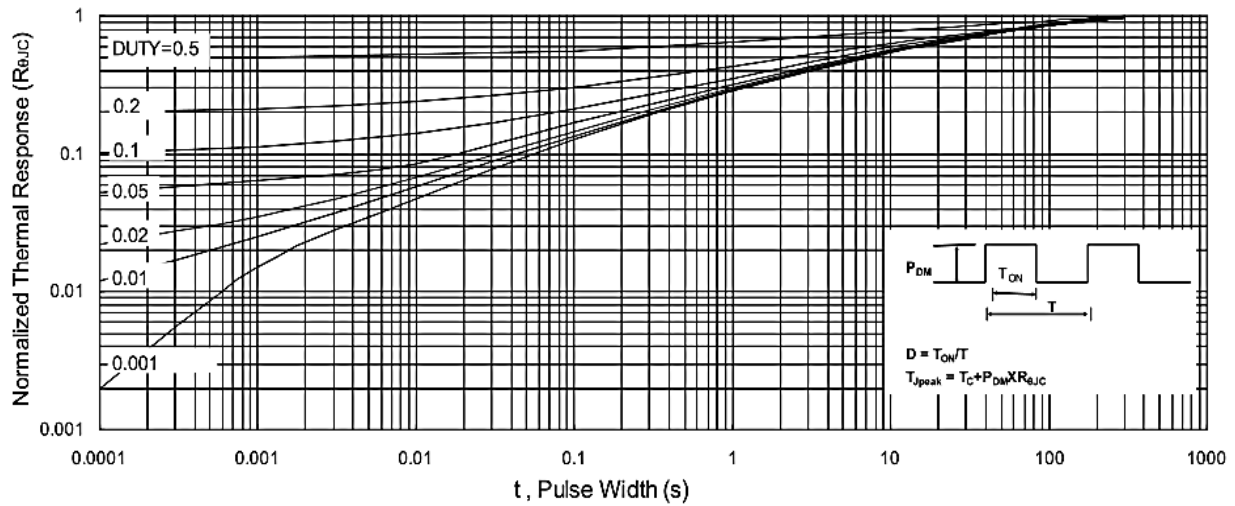


Fig.9 Normalized Maximum Transient Thermal Impedance

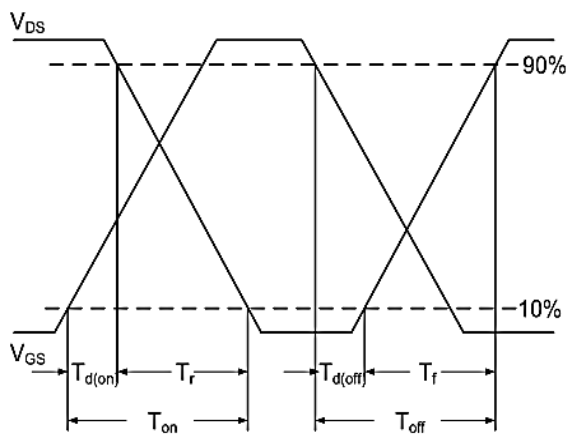


Fig.10 Switching Time Waveform

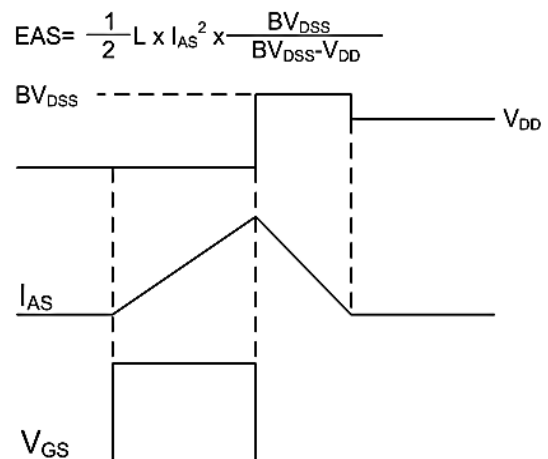


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

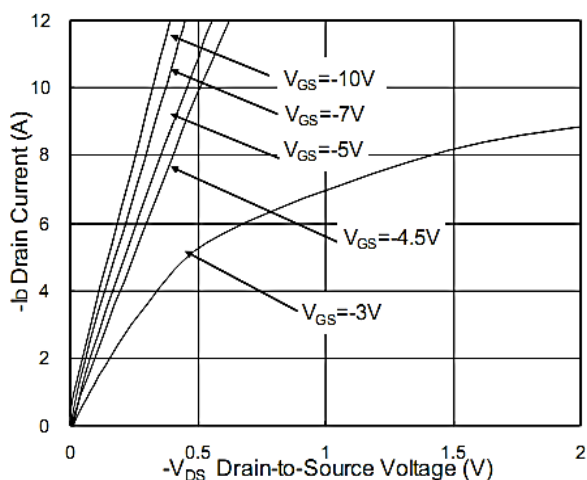


Fig.1 Typical Output Characteristics

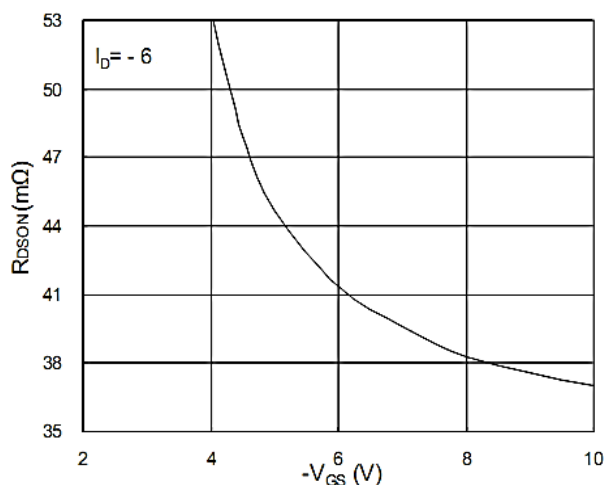


Fig.2 On-Resistance vs. G-S Voltage

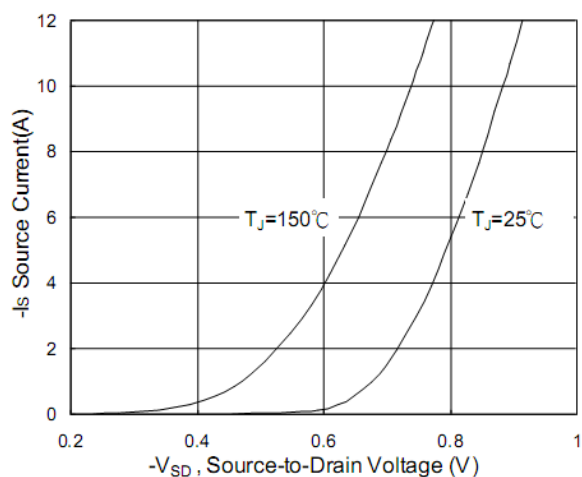


Fig.3 Source Drain Forward Characteristics

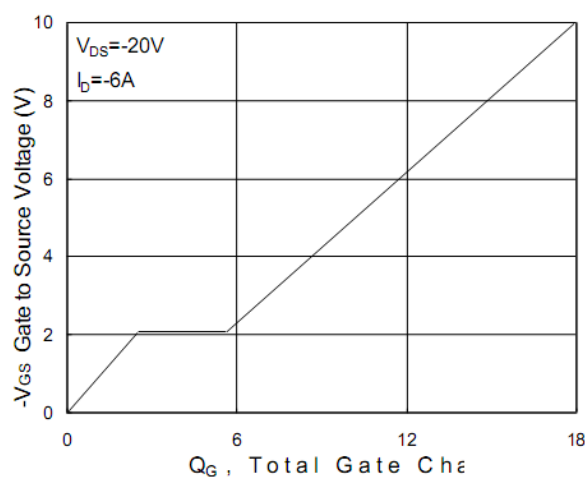


Fig.4 Gate-Charge Characteristics

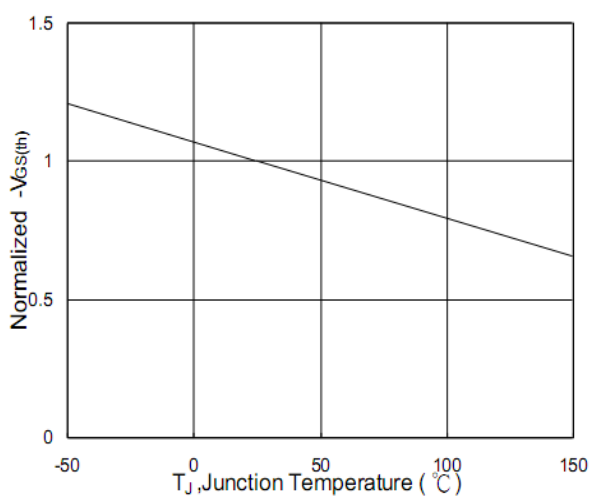


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

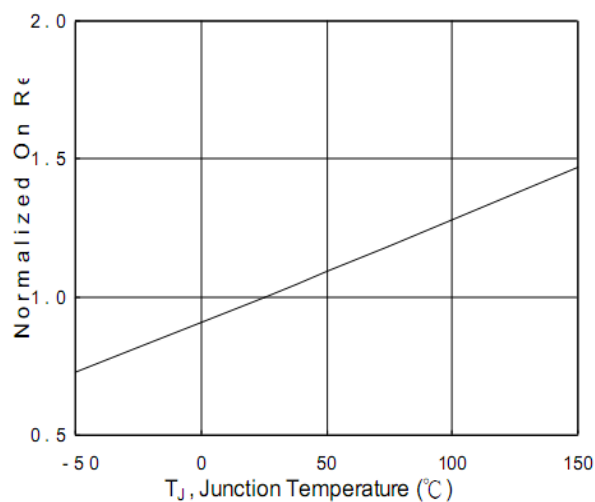


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Ratings and Characteristic Curves

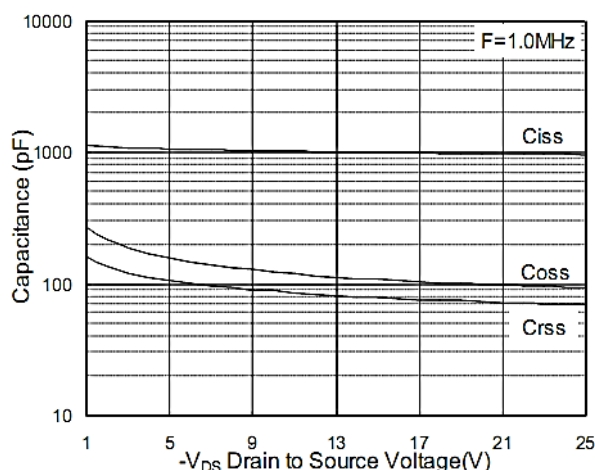


Fig.7 Capacitance

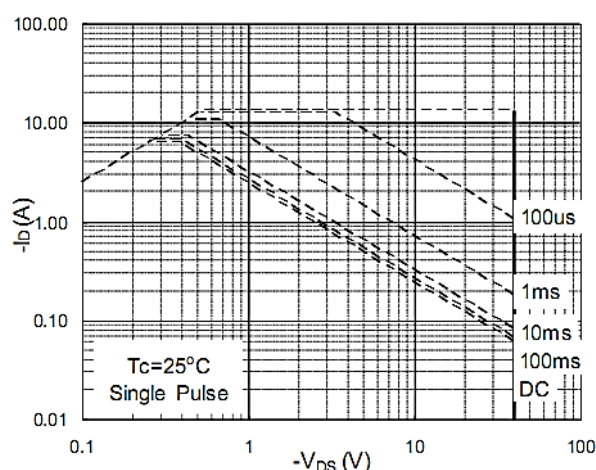


Fig.8 Safe Operating Area

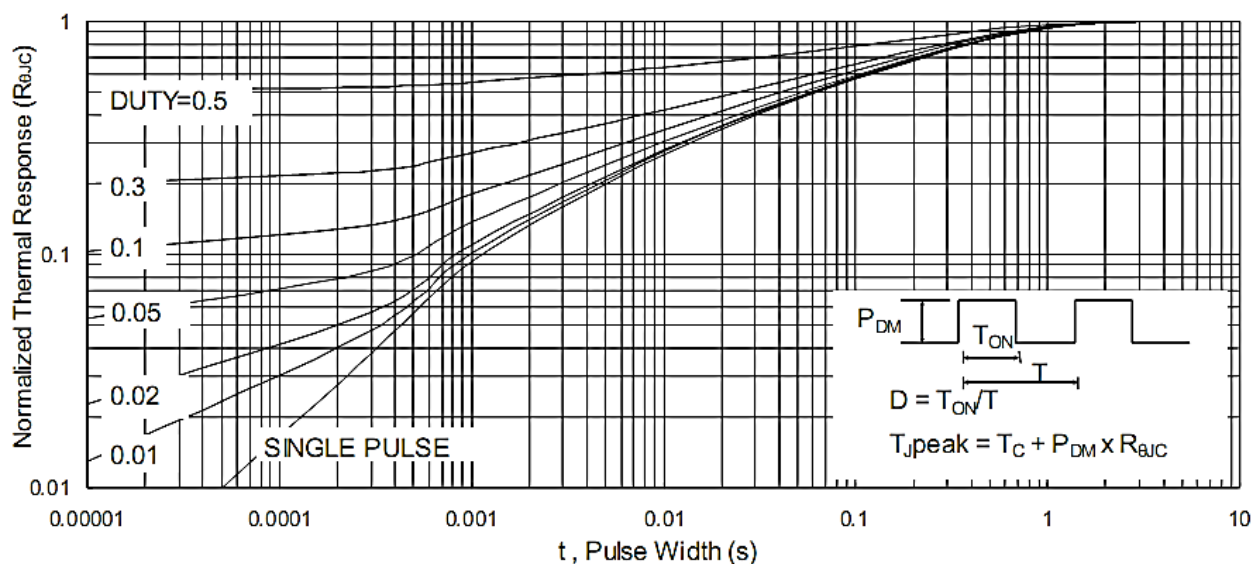


Fig.9 Normalized Maximum Transient Thermal Impedance

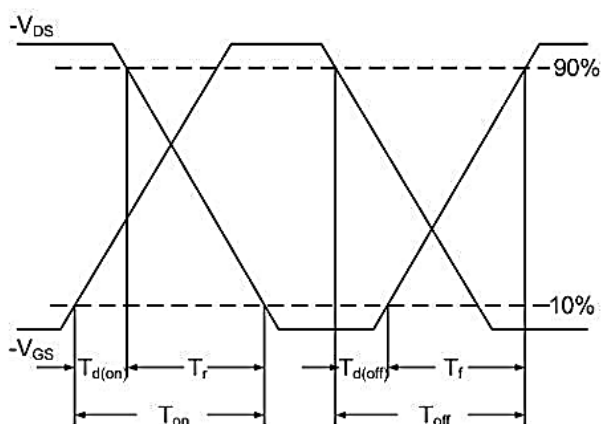


Fig.10 Switching Time Waveform

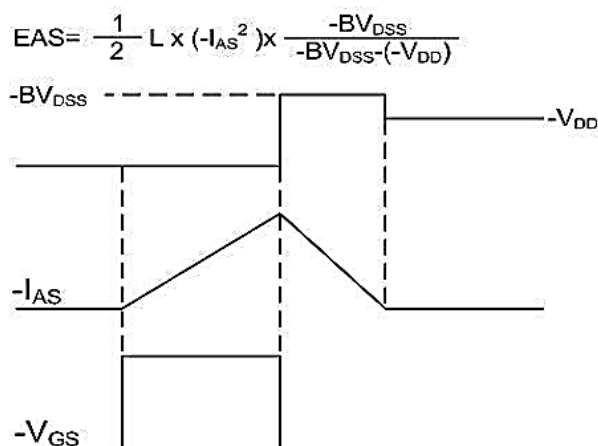
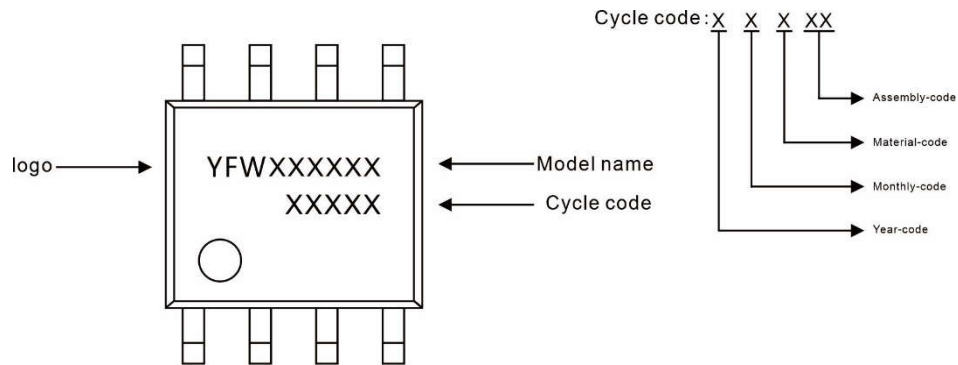


Fig.11 Unclamped Inductive Waveform

Marking Diagram



Ordering information

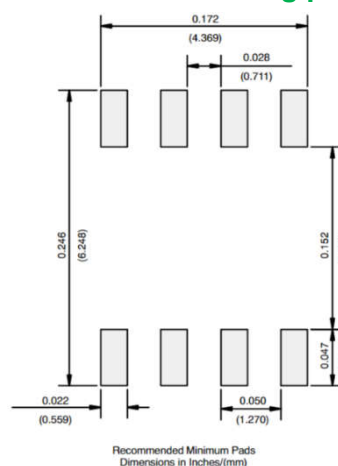
Package	Packing Description	Packing Quantity
SOP-8	Tape/Reel, 13" reel	3000PCS/Reel 30000PCS/Carton

Package Dimensions

SOP-8

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.35	1.50	0.053	0.059
b	0.35	0.55	0.014	0.022
c	0.15	0.25	0.006	0.010
D	4.80	5.00	0.189	0.197
D1	3.10	3.50	0.122	0.138
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
E2	2.20	2.60	0.087	0.102
e	1.27 (BSC)		0.050 (BSC)	
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

The recommended mounting pad size



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