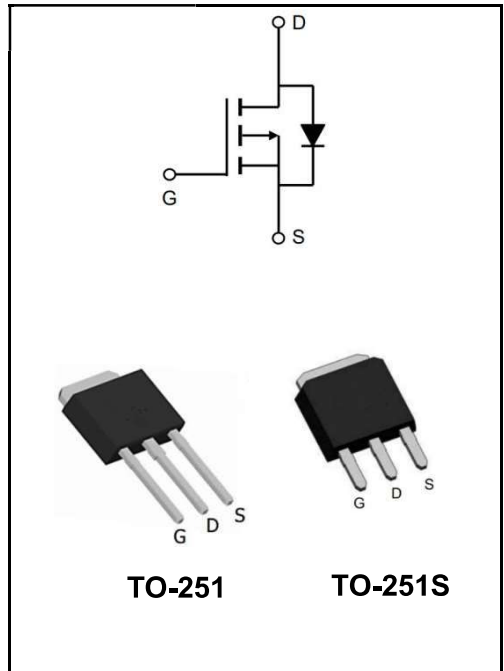


-60V P-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

I_D	-13.5A
V_{DSS}	-60V
R_{DS(on)-typ(@V_{GS}=-10V)}	< 90mΩ(Type:80 mΩ)



Application

- ◆Brushless motor
- ◆Load switch
- ◆Uninterruptible power supply

Product Specification Classification

Part Number	Package	Marking	Pack
YFW13P06AMJ	TO-251	YFW 13P06AMJ XXXXX	4000PCS/Tape
YFW13P06AMJ	TO-251S	YFW 13P06AMJ XXXXX	4000PCS/Tape

Maximum Ratings at T_c=25°C unless otherwise specified

Characteristics	Symbols	Value	Units
Drain-Source Voltage	V _{DS}	-60	V
Gate - Source Voltage	V _{GS}	±20	V
Continuous Drain Current, V _{GS} @ -10V ¹ @T _C =25°C	I _D	-13.5	A
Continuous Drain Current, V _{GS} @ -10V ¹ @T _C =100°C	I _D	-8.3	A
Continuous Drain Current, V _{GS} @ -10V ¹ @T _A =25°C	I _D	-3.3	A
Continuous Drain Current, V _{GS} @ -10V ¹ @T _A =70°C	I _D	-2.7	A
Pulsed Drain Current ²	I _{DM}	-26	A
Single Pulse Avalanche Energy ³	E _{AS}	29.8	mJ
Avalanche Current	I _{AS}	-24.4	A
Total Power Dissipation ⁴ @T _C =25°C	P _D	31.3	W
Total Power Dissipation ⁴ @T _A =25°C	P _D	2	W
Storage Temperature Range	T _{STG}	-55 to +150	°C
Operating Junction Temperature Range	T _J	-55 to +150	°C
Thermal Resistance Junction-Ambient ¹	R _{θJA}	62	°C/W
Thermal Resistance Junction to Case ¹	R _{θJC}	4.0	°C/W

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	BV_{DSS}	-60	-	-	V
BV_{DSS} Temperature Coefficient	Reference to 25°C, $I_D=-1mA$	$\Delta BV_{DSS}/\Delta T_J$	-	-0.03	-	V/°C
Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-3A$	$R_{DS(ON)}$	-	80	90	mΩ
	$V_{GS}=-4.5V, I_D=-2A$		-	100	115	
Gate -Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	$V_{GS(th)}$	-1.2	1.75	-2.5	V
Drain-Source Leakage Current	$V_{DS}=-48V, V_{GS}=0V, T_J=25^\circ C$	I_{DSS}	-	-	-1	μA
	$V_{DS}=-48V, V_{GS}=0V, T_J=55^\circ C$		-	-	-5	
Gate -Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{GSS}	-	-	±100	nA
Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	g_{fs}	-	8.5	-	S
Total Gate Charge(-4.5V)	$V_{DS}=-48V$ $V_{GS}=-4.5V$ $I_D=-3A$	Q_g	-	12.1	-	nC
Gate-Source Charge		Q_{gs}	-	2.2	-	
Gate-Drain Charge		Q_{gd}	-	6.3	-	
Turn-on delay time	$V_{DS}=-15V$ $V_{GS}=-10V$ $I_D=-1A$ $R_G=3.3$	$t_{d(on)}$	-	9.2	-	ns
Rise Time		T_r	-	20.1	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	46.7	-	
Fall Time		t_f	-	9.4	-	
Input Capacitance	$V_{DS}=-15V$ $V_{GS}=0V$ $f=1MHz$	C_{iss}	-	1137	-	pF
Output Capacitance		C_{oss}	-	76	-	
Reverse Transfer Capacitance		C_{rss}	-	50	-	
Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	I_S	-	-	-13	A
Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^\circ C$	V_{SD}	-	-	-1.2	V

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width $\cong 300\mu s$, duty cycle $\cong 2\%$
- 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 I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Ratings and Characteristic Curves

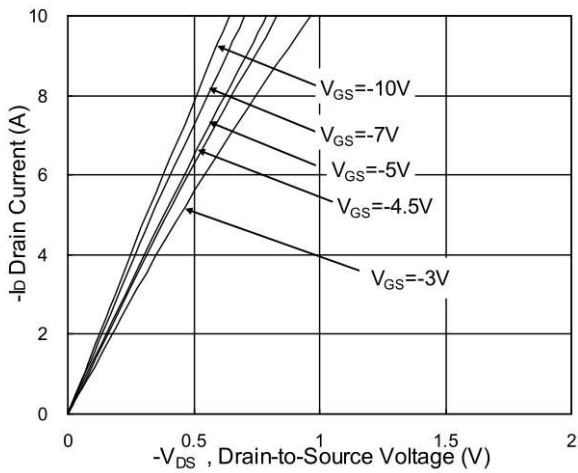


Fig.1 Typical Output Characteristics

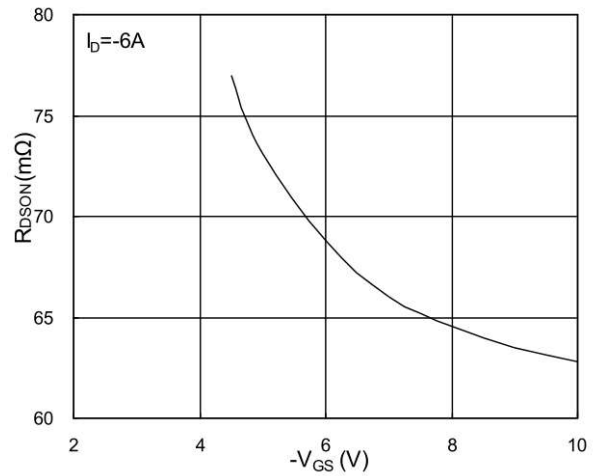


Fig.2 On-Resistance v.s Gate-Source

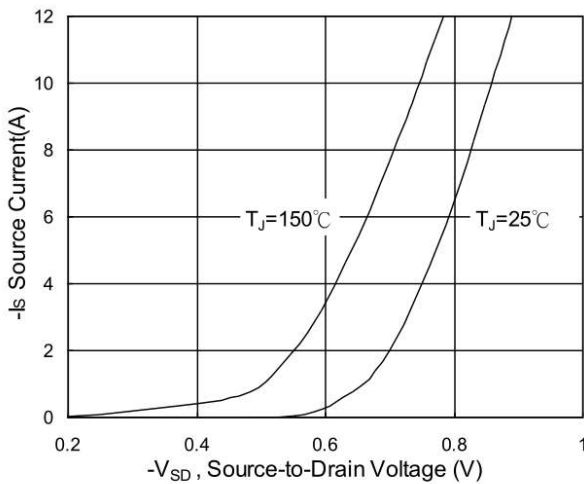


Fig.3 Forward Characteristics of Reverse

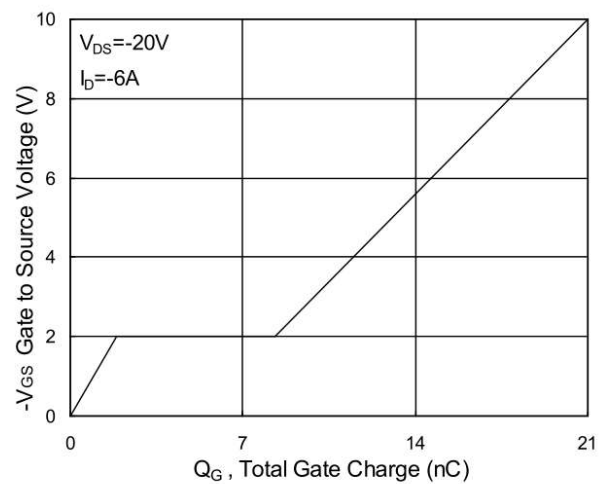


Fig.4 Gate-Charge Characteristics

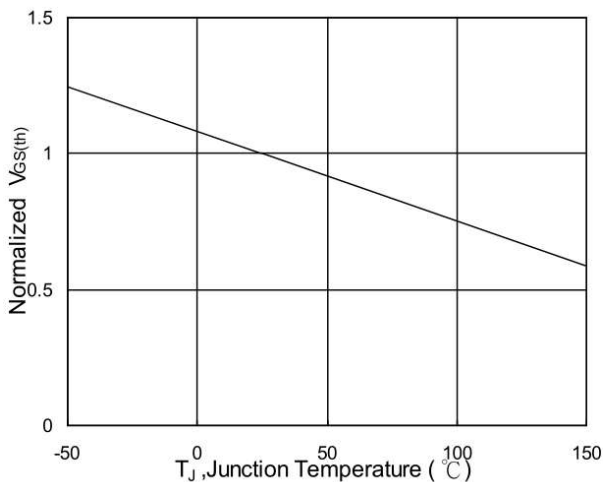


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

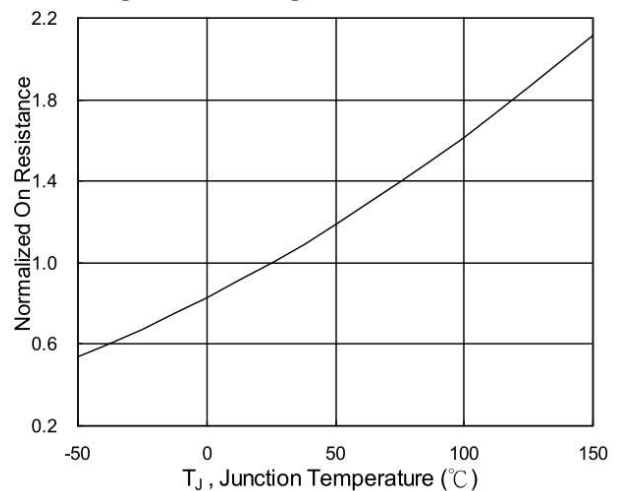


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

Ratings and Characteristic Curves

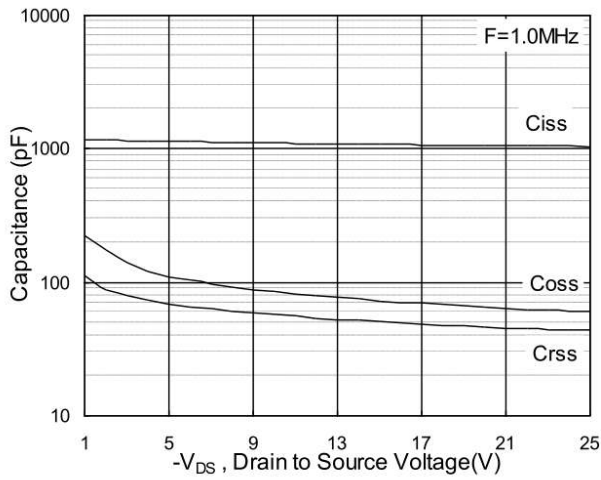


Fig.7 Capacitance

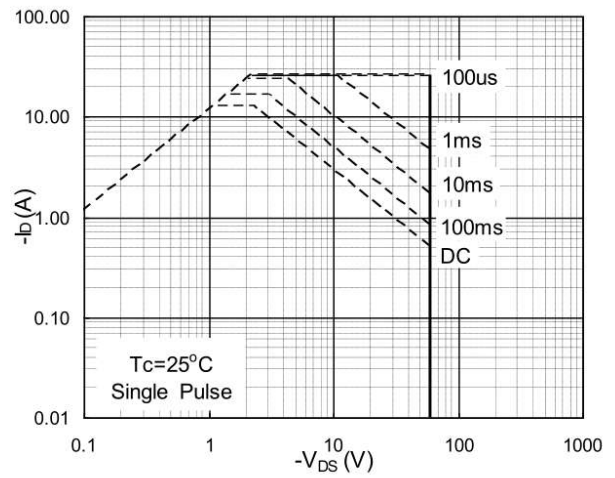


Fig.8 Safe Operating Area

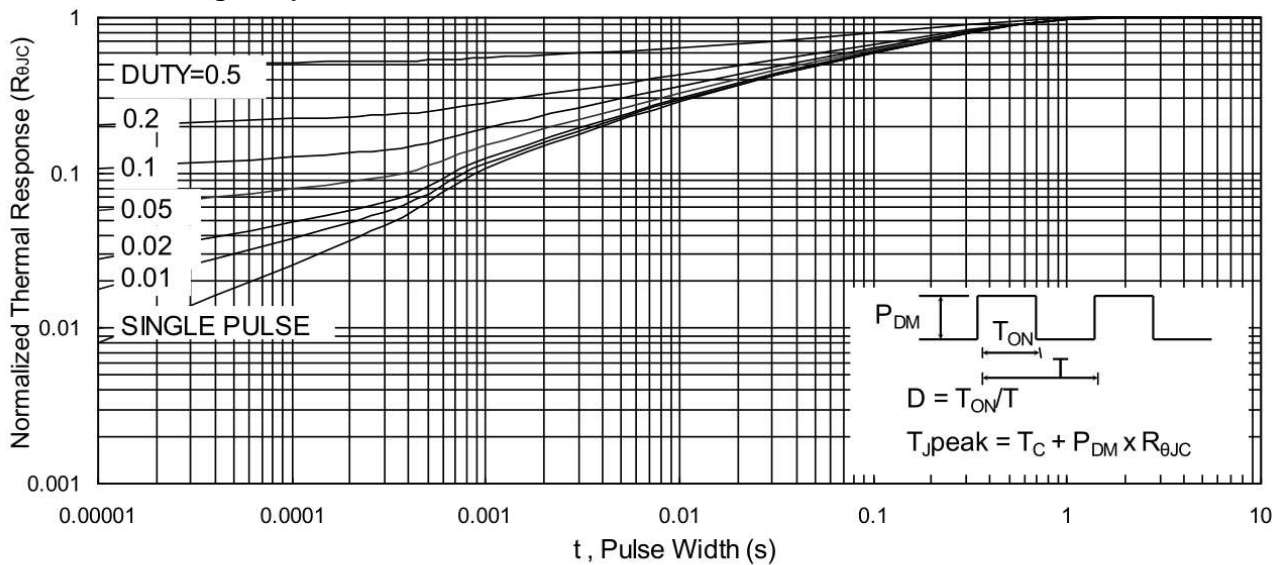


Fig.9 Normalized Maximum Transient Thermal Impedance

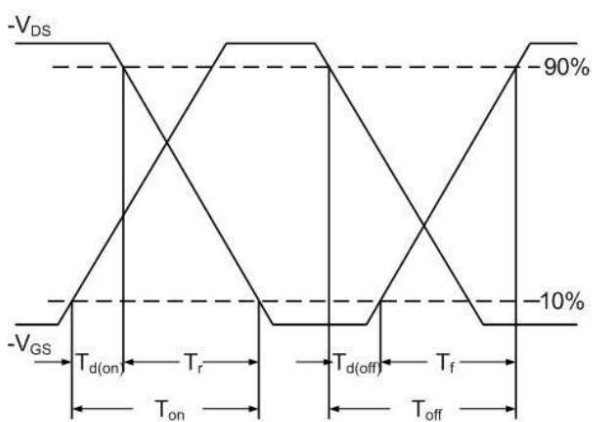


Fig.10 Switching Time Waveform

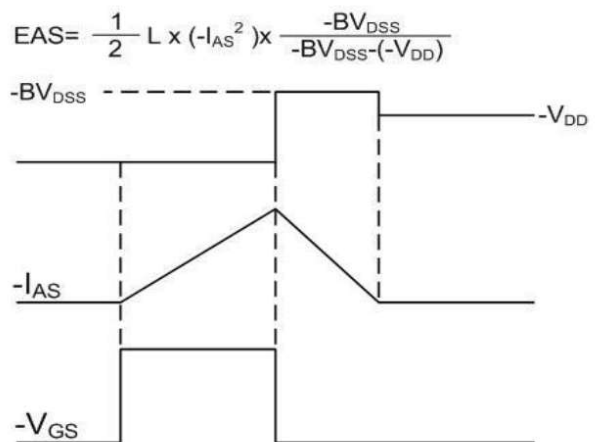
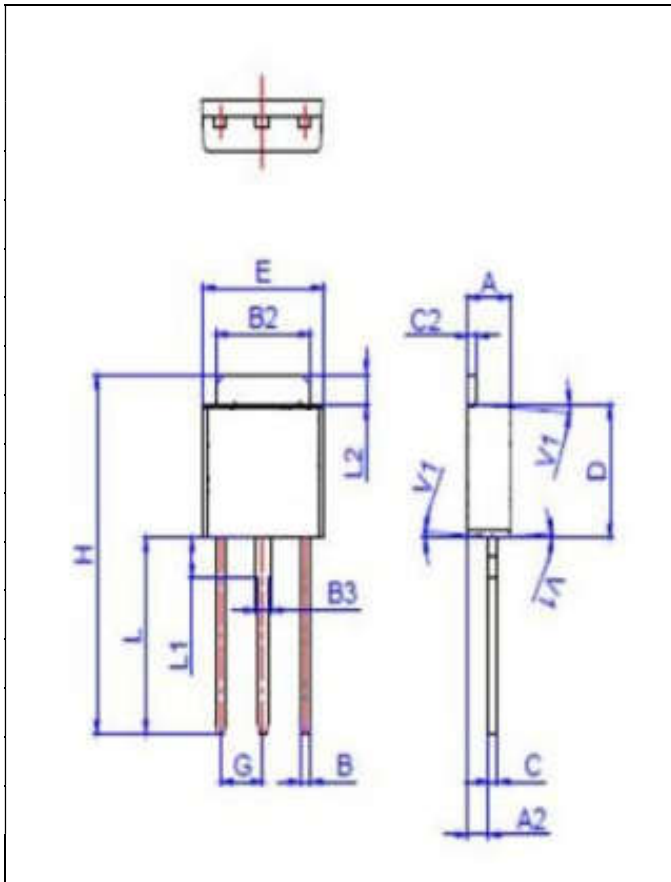


Fig.11 Unclamped Inductive Switching Waveform

Package Outline Dimensions Millimeters

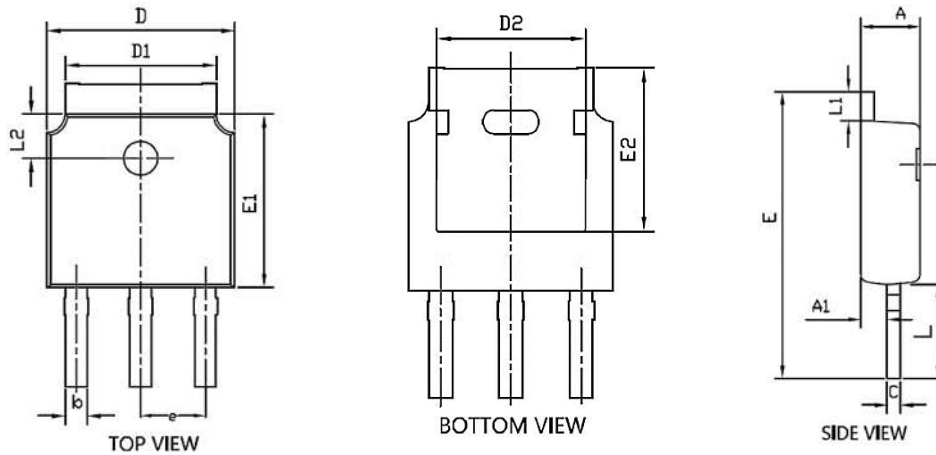
TO-251



Pef.	Dimensions					
	Millometers			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.088		0.095
A2	0.90		1.20	0.035		0.047
B	0.55		0.65	0.022		0.026
B2	5.10		5.40	0.200		0.213
B3	0.76		0.85	0.030		0.033
C	0.45		0.62	0.018		0.024
C2	0.48		0.62	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.70	0.252		0.264
G		2.30			0.091	
H	16.0		17.0	0.630		0.669
L	8.90		9.40	0.350		0.370
L1	1.80		1.90	0.071		0.075
L2	1.37		1.50	0.054		0.059
V1		4°			4°	

Package Outline Dimensions Millimeters

TO-251S



Symbol	Common		
	mm		
	Mim	Nom	Max
A	2.2	2.3	2.4
A1	0.9	1.0	1.1
b	0.66	0.76	0.86
C	0.46	0.52	0.58
D	6.50	6.6	6.7
D1	5.15	5.3	5.45
D2	4.6	4.8	4.95
E	10.4	----	11.5
E1	6.0	6.1	6.2
E2	5.400REF		
e	2.286BSC		
L	3.5	4.0	4.3
L1	0.9	---	1.27
L2	1.4	---	1.9