

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-60V	90mΩ@-10V	-13.5A
	115mΩ@-4.5V	

Feature

- Advanced trench technology
- Excellent $R_{DS(on)}$
- Low gate charge

Application

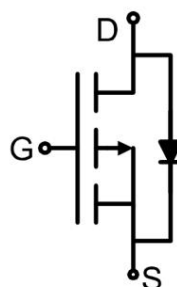
- Brushless motor
- Load switch
- Uninterruptible power supply

Package

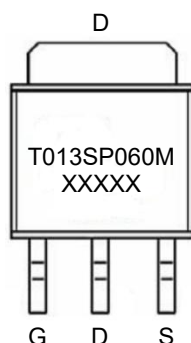


TO-251AB

Circuit diagram



Marking



Absolute maximum ratings (T_c=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	-60	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current ¹⁾ (V _{GS} =-10V)	I _D	-13.5	A
Continuous Drain Current ¹⁾ (V _{GS} =-10V, T _c =100°C)	I _D (100°C)	-8.3	A
Pulsed Drain Current ²⁾	I _{DM}	-26	A
Single Pulse Avalanche Energy ³⁾	E _{AS}	29.8	mJ
Power Dissipation ⁴⁾	P _D	31.3	W
Thermal Resistance, Junction-to-Case ¹⁾	R _{θJC}	4	°C/W
Operating Junction Temperature	T _J	-55 ~ +150	°C
Storage Temperature	T _{STG}	-55 ~ +150	°C

Electrical characteristics (T_J=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =-250μA	-60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-48V, V _{GS} =0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.2	-1.75	-2.5	V
Drain-source on-resistance ²⁾	R _{DS(on)}	V _{GS} =-10V, I _D =-3A		80	90	mΩ
		V _{GS} =-4.5V, I _D =-2A		100	115	
Dynamic characteristics ⁶⁾						
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, f =1MHz		1137		pF
Output Capacitance	C _{oss}			76		
Reverse Transfer Capacitance	C _{rss}			50		
Total Gate Charge	Q _g	V _{DS} =-48V, V _{GS} =-4.5V I _D =-3A		12.1		nC
Gate-Source Charge	Q _{gs}			2.2		
Gate-Drain Charge	Q _{gd}			6.3		
Turn-on delay time	t _{d(on)}	V _{DS} =-15V, V _{GS} =-10V I _D =-1A, R _G =3.3Ω		9.2		nS
Turn-on rise time	t _r			20.1		
Turn-off delay time	t _{d(off)}			46.7		
Turn-off fall time	t _f			9.4		
Source-Drain Diode characteristics						
Diode Forward Current ^{1,5)}	I _S	V _D =V _G =0V , Force Current			-13	A
Diode Forward voltage ²⁾	V _{DS}	V _{GS} =0V, I _S =-1A			-1.2	V

Notes:

- 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 ≤ 300μs, 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} = -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.
- 6) Guaranteed by design, not subject to production testing.

Typical Characteristics

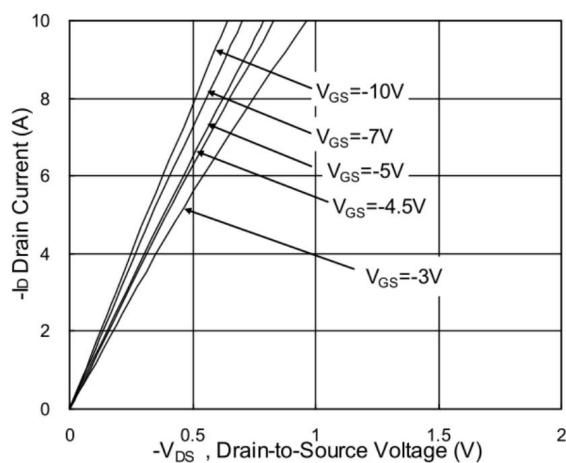


Fig.1 Typical Output Characteristics

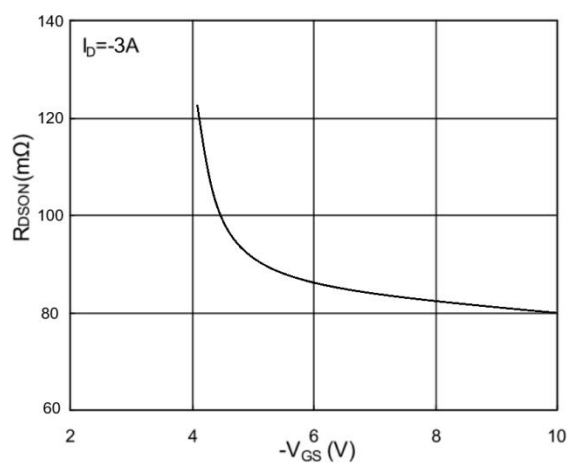


Fig.2 On-Resistance v.s Gate-Source

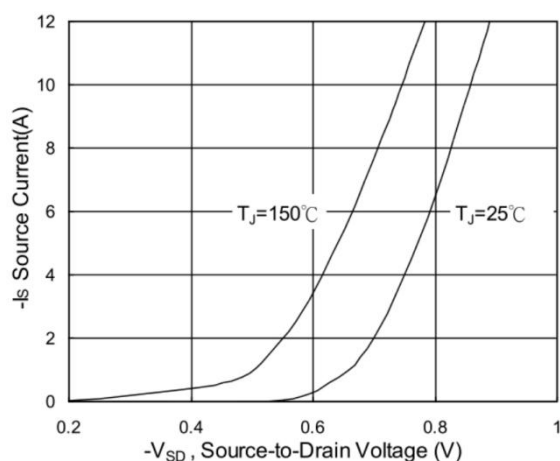


Fig.3 Forward Characteristics of Reverse

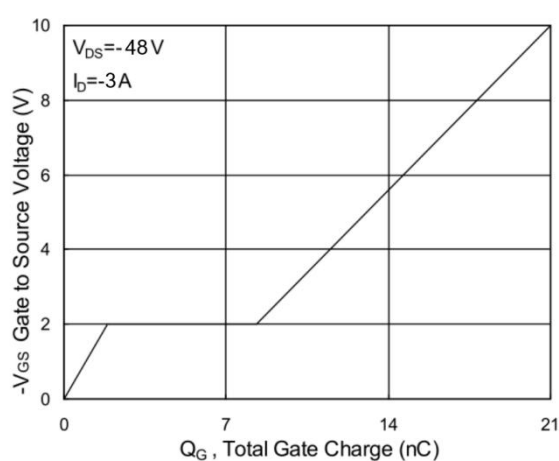


Fig.4 Gate-Charge Characteristics

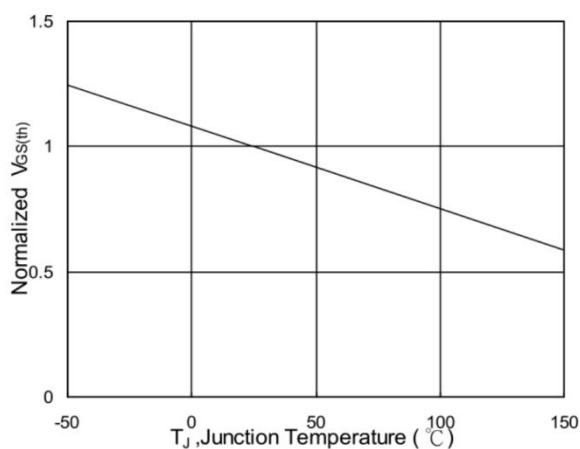


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

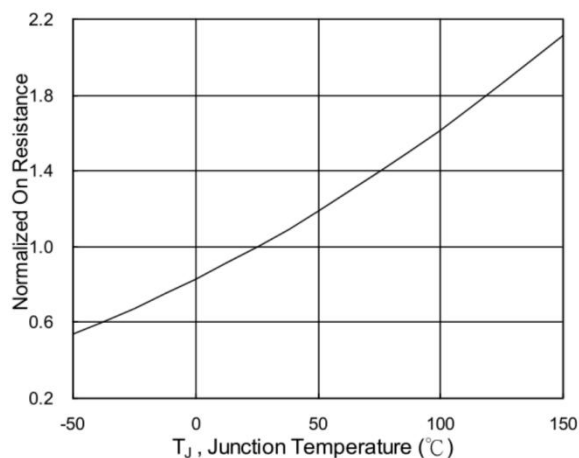


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

Typical Characteristics

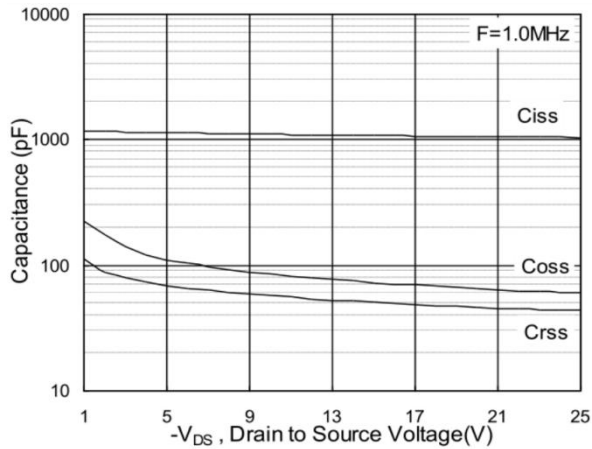


Fig.7 Capacitance

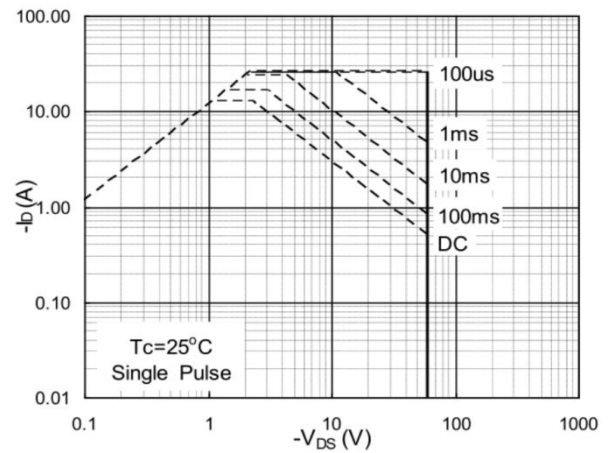


Fig.8 Safe Operating Area

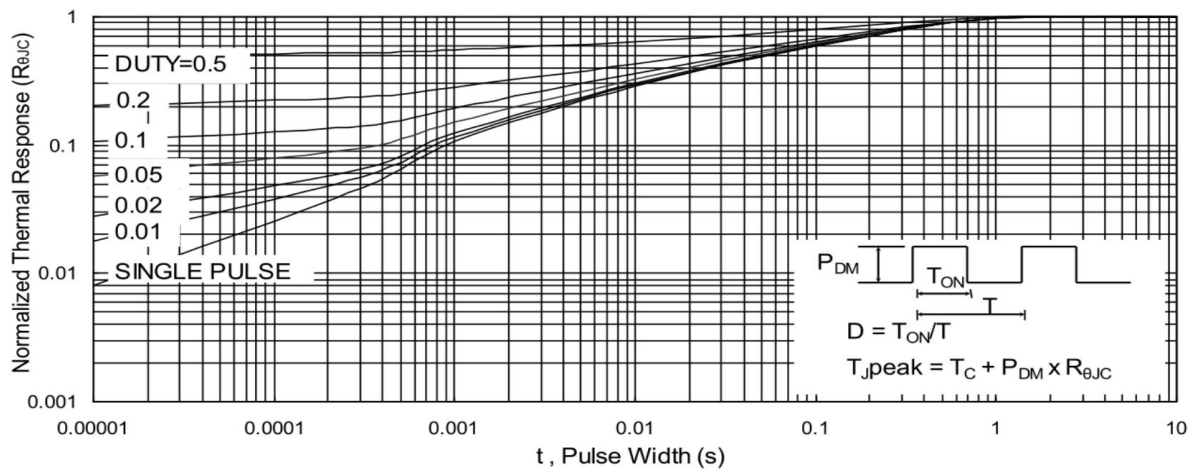


Fig.9 Normalized Maximum Transient Thermal Impedance

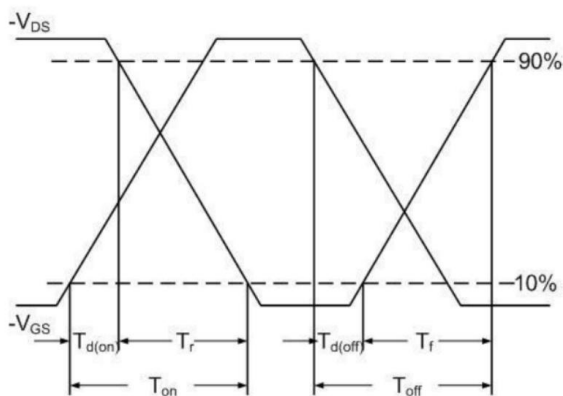


Fig.10 Switching Time Waveform

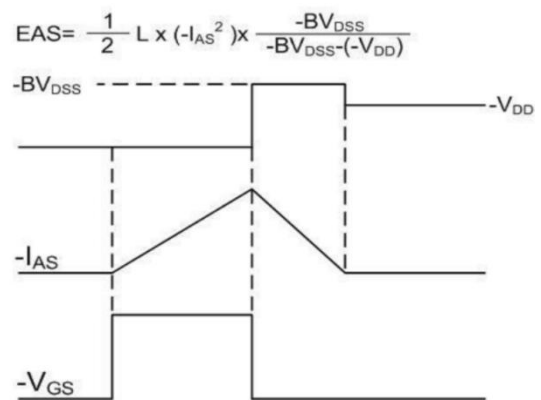
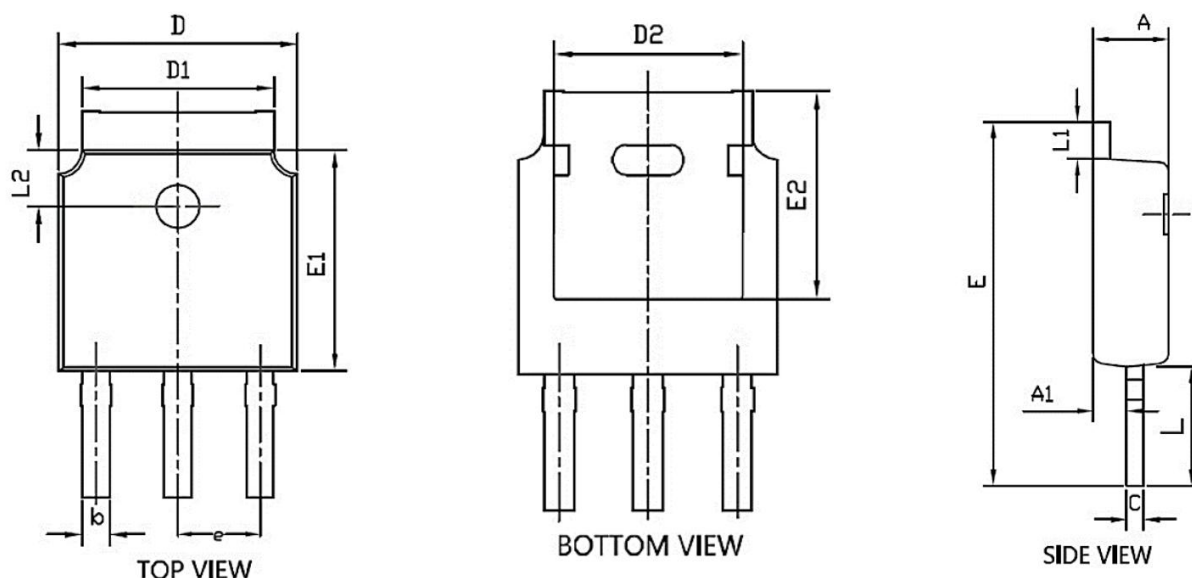


Fig.11 Unclamped Inductive Switching Waveform

TO-251AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.900	1.100	0.035	0.043
b	0.660	0.860	0.026	0.034
C	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.150	5.450	0.203	0.215
D2	4.600	4.950	0.181	0.195
E	10.400	11.500	0.409	0.453
E1	6.000	6.200	0.236	0.244
E2	5.400 REF.		0.213 REF.	
e	2.286 BSC.		0.090 BSC.	
L	3.500	4.300	0.138	0.169
L1	0.900	1.270	0.035	0.050
L2	1.400	1.900	0.055	0.075