

**Features**

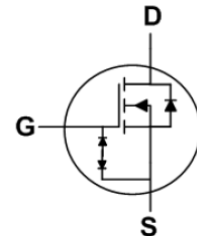
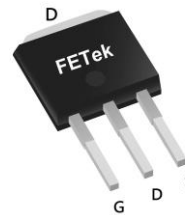
- Advanced Trench MOS Technology
- Low Gate Charge
- Low  $R_{DS(ON)}$
- 100% EAS Guaranteed
- Green Device Available

**Applications**

- Motor Control.
- DC/DC Converter.
- Synchronous rectifier applications.

**Product Summary**


BVDSS	RDSON	ID
60V	8.5mΩ	60A

**TO251 Pin Configuration**

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current <sup>1,6</sup>	60	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current <sup>1,6</sup>	38	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	120	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	64.8	mJ
$I_{AS}$	Avalanche Current	36	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	52	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	60	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	2.4	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=20A$	---	6.3	8.5	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$	---	10.8	12.5	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	2.0	2.3	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=48V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=48V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 10$	$\mu A$
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	3	---	$\Omega$
$Q_g$	Total Gate Charge( $V_{GS}=4.5V$ )	$V_{DS}=30V, V_{GS}=4.5V, I_D=20A$	---	11.9	---	nC
$Q_{gs}$	Gate-Source Charge		---	3.7	---	
$Q_{gd}$	Gate-Drain Charge		---	6.0	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=30V, V_{GS}=10V, R_G=2.2\Omega, I_D=20A$	---	7	---	ns
$T_r$	Rise Time		---	4.5	---	
$T_{d(off)}$	Turn-Off Delay Time		---	28	---	
$T_f$	Fall Time		---	3.5	---	
$C_{iss}$	Input Capacitance	$V_{DS}=30V, V_{GS}=0V, f=1\text{MHz}$	---	1010	---	pF
$C_{oss}$	Output Capacitance		---	348	---	
$C_{rss}$	Reverse Transfer Capacitance		---	25	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,5,6</sup>	$V_G=V_D=0V$ , Force Current	---	---	60	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=20A, di/dt=100A/\mu s,$	---	21	---	nS
$Q_{rr}$	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	70	---	

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  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=36A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  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.The maximum current rating is package limited.

Typical Characteristics

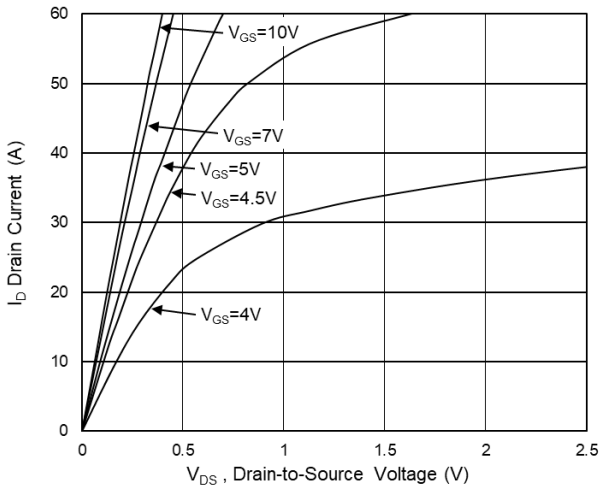


Fig.1 Typical Output Characteristics

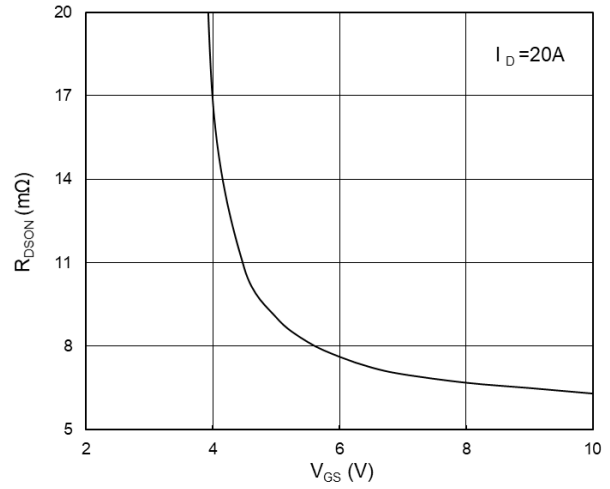


Fig.2 On-Resistance vs G-S Voltage

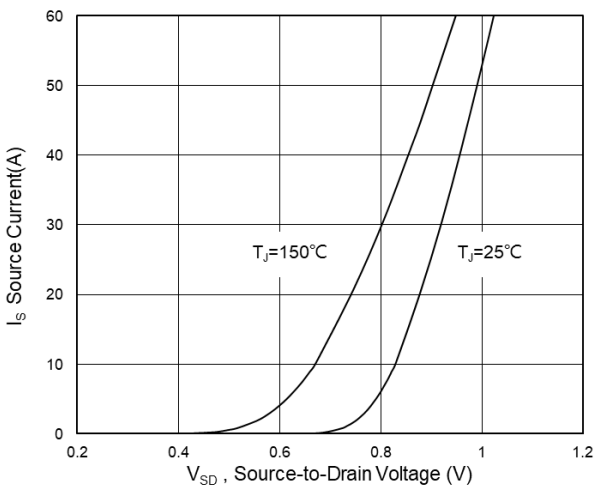


Fig.3 Source Drain Forward Characteristics

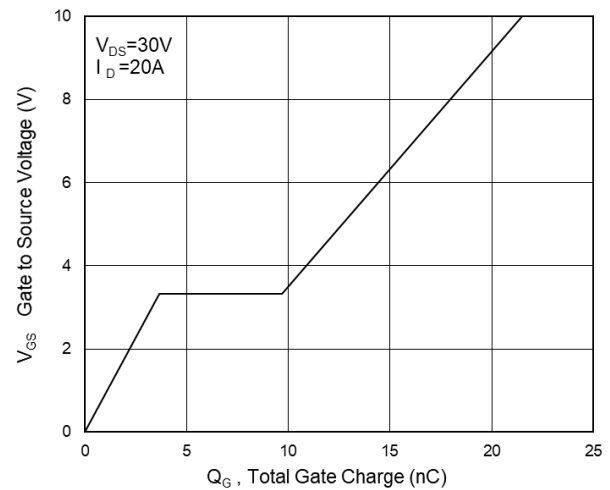


Fig.4 Gate-Charge Characteristics

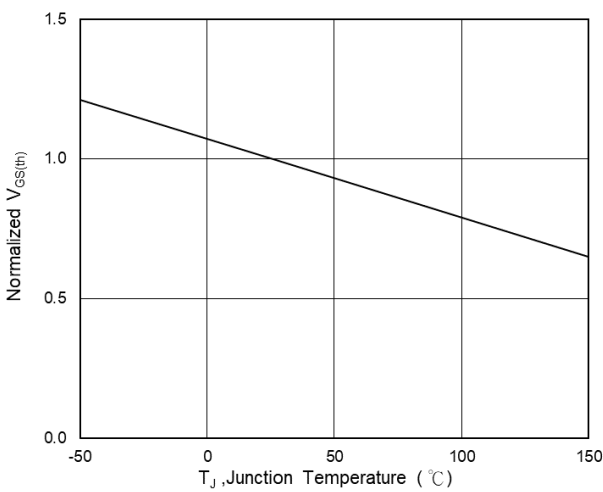


Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$

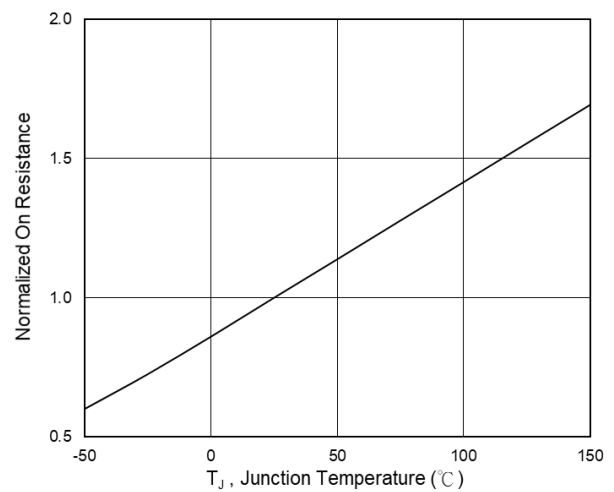


Fig.6 Normalized  $R_{DSON}$  vs  $T_J$

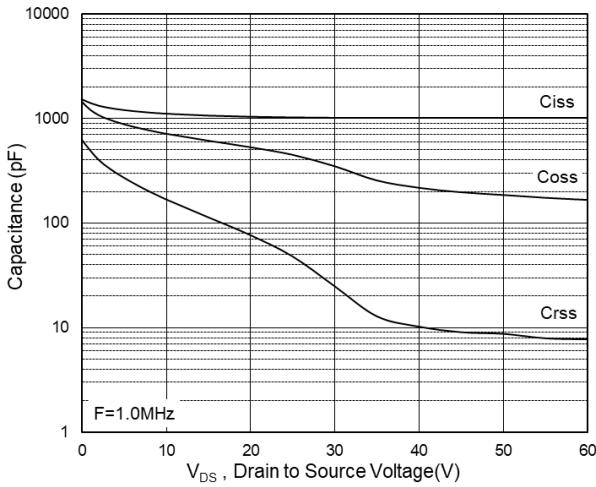


Fig.7 Capacitance

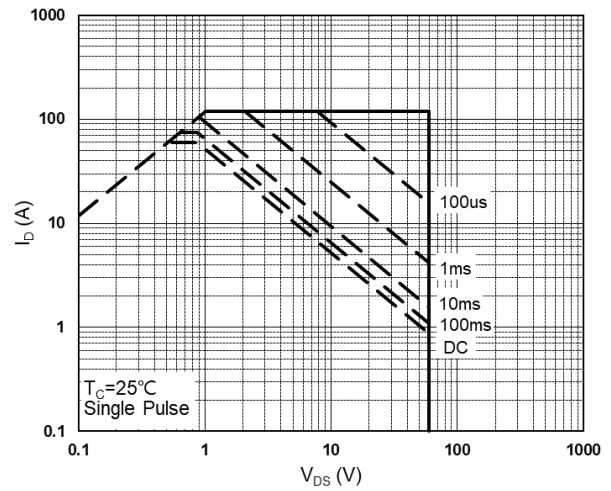


Fig.8 Safe Operating Area

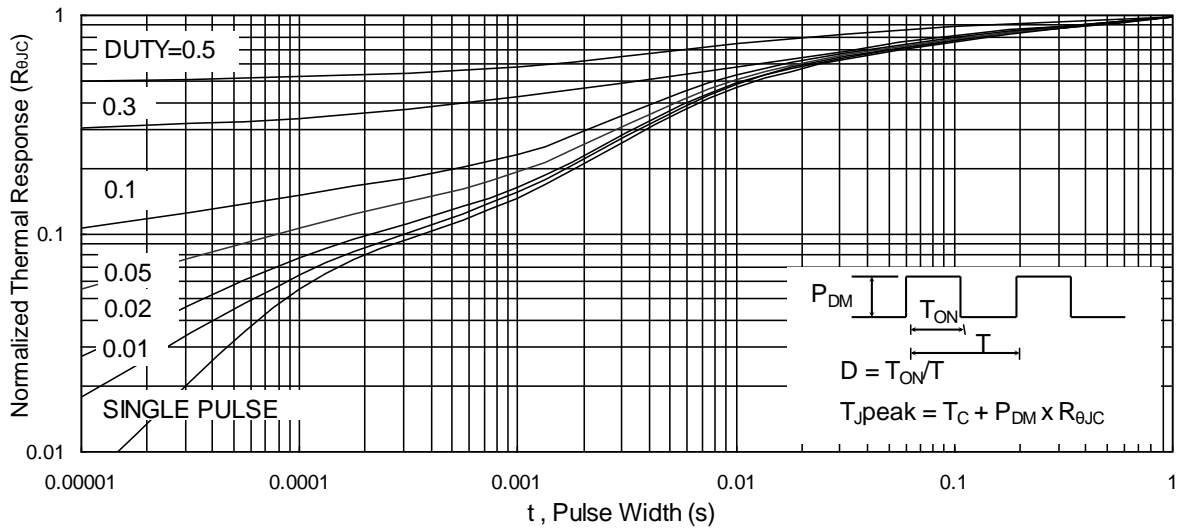


Fig.9 Normalized Maximum Transient Thermal Impedance

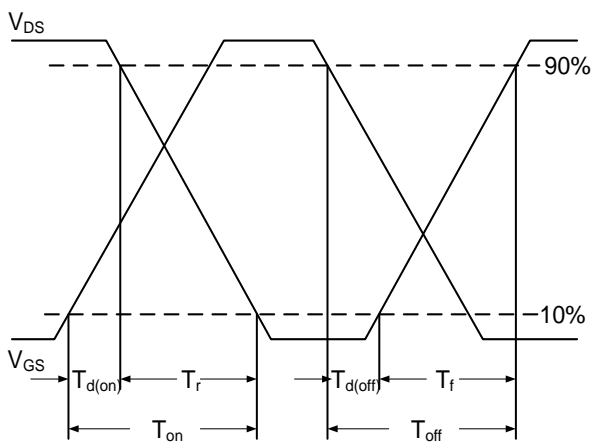


Fig.10 Switching Time Waveform

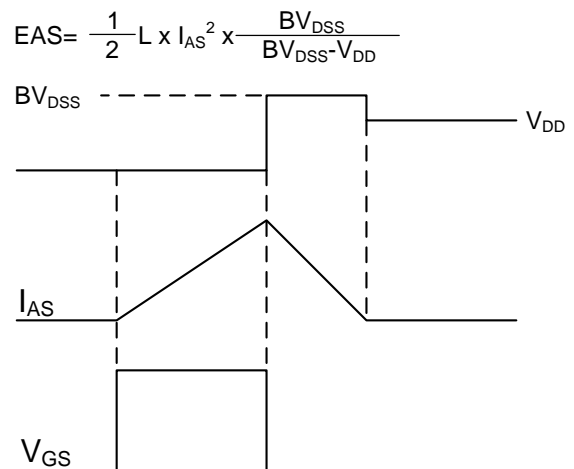


Fig.11 Unclamped Inductive Waveform