

**Features**

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

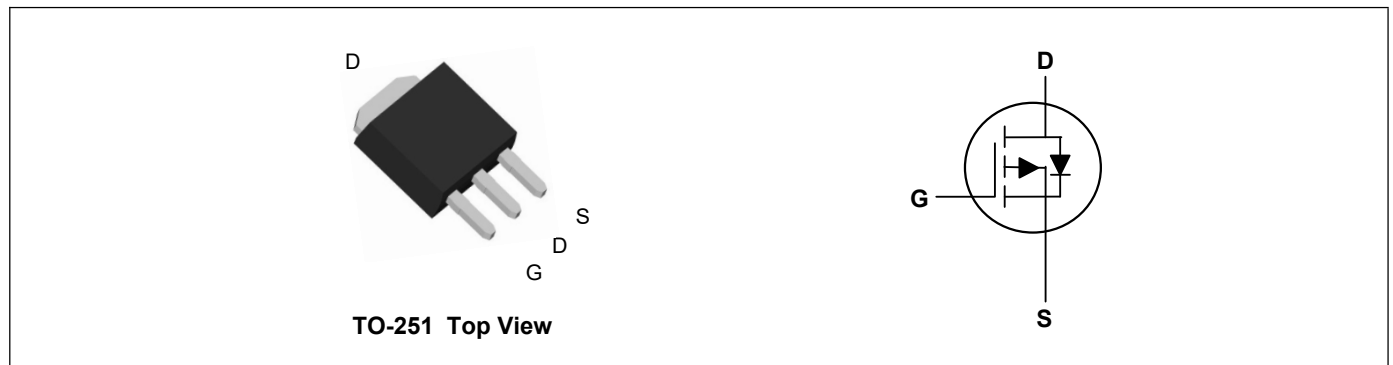
**Product Summary**



$V_{DS}$	-30	V
$I_D$	-57	A
$R_{DS(ON)}$ (at $V_{GS}=-10V$ )	10.5	mΩ
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$ )	18.5	mΩ

**Applications**

- High Frequency Point-of-Load, Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch



**Absolute Maximum Ratings ( $T_C=25^{\circ}C$ , unless otherwise noted)**

Parameter	Symbol	Rating		Units
		10S	Steady State	
Drain-Source Voltage	$V_{DS}$	-30		V
Gate-Source Voltage	$V_{GS}$	±25		V
Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup>	$I_D@T_C=25^{\circ}C$	-57		A
Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup>	$I_D@T_C=100^{\circ}C$	-36		A
Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup>	$I_D@T_A=25^{\circ}C$	-17.8	-11.3	A
Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup>	$I_D@T_A=70^{\circ}C$	-14.2	-9	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	-180		A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	153		mJ
Avalanche Current	$I_{AS}$	-55.4		A
Total Power Dissipation <sup>4</sup>	$P_D@T_C=25^{\circ}C$	52.1		W
Total Power Dissipation <sup>4</sup>	$P_D@T_A=25^{\circ}C$	5	2	W
Storage Temperature Range	$T_{STG}$	-55 to 150		°C
Operating Junction Temperature Range	$T_J$	-55 to 150		°C

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s)	$R_{\theta JA}$	---	25	°C/W
Thermal Resistance Junction-Ambient <sup>1</sup>		---	62	°C/W
Thermal Resistance Junction-Case <sup>1</sup>	$R_{\theta JC}$	---	2.4	°C/W

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	---	---	V
BV <sub>DSS</sub> Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.018	---	V/°C
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	---	---	10.5	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-12A	---	---	18.5	mΩ
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.0	---	-2.5	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub>		---	5.04	---	mV/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	-5	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V	---	---	±100	nA
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-30A	---	26.4	---	S
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A	---	33	---	nC
Gate-Source Charge	Q <sub>gs</sub>		---	10.7	---	
Gate-Drain Charge	Q <sub>gd</sub>		---	12.8	---	
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-12A	---	8	---	ns
Rise Time	T <sub>r</sub>		---	17.8	---	
Turn-Off Delay Time	T <sub>d(off)</sub>		---	78.4	---	
Fall Time	T <sub>f</sub>		---	43.6	---	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	3448	---	pF
Output Capacitance	C <sub>oss</sub>		---	508	---	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	421	---	

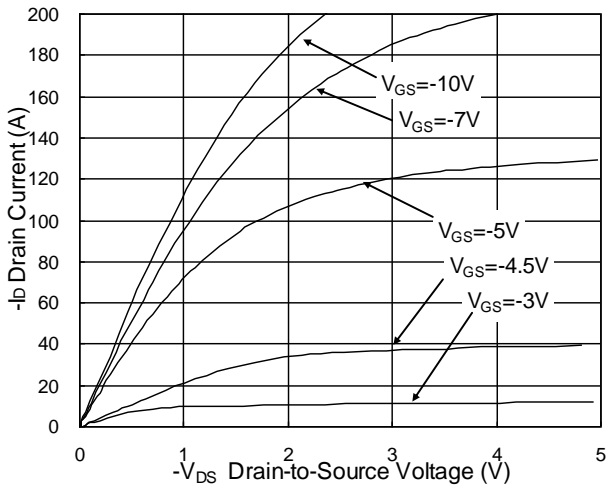
**Drain-Source Diode Characteristics**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current <sup>1,5</sup>	I <sub>S</sub>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-57	A
Pulsed Source Current <sup>2,5</sup>	I <sub>SM</sub>		---	---	-180	A
Diode Forward Voltage <sup>2</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =-15A, di/dt=100A/μs, T <sub>J</sub> =25°C	---	29	---	nS
Reverse Recovery Charge	Q <sub>rr</sub>		---	15	---	nC

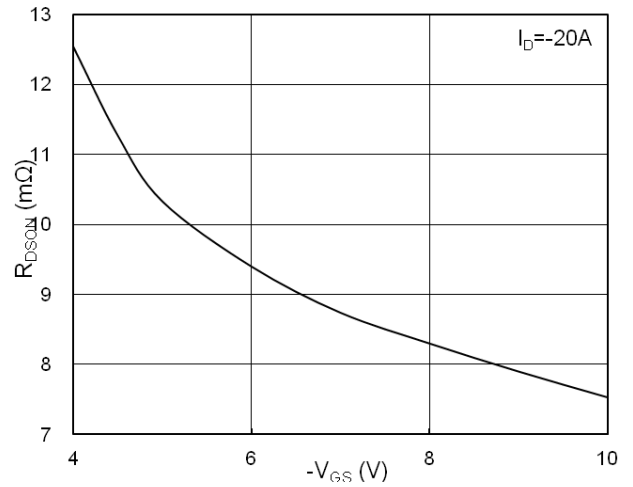
**Note:**

- 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 ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

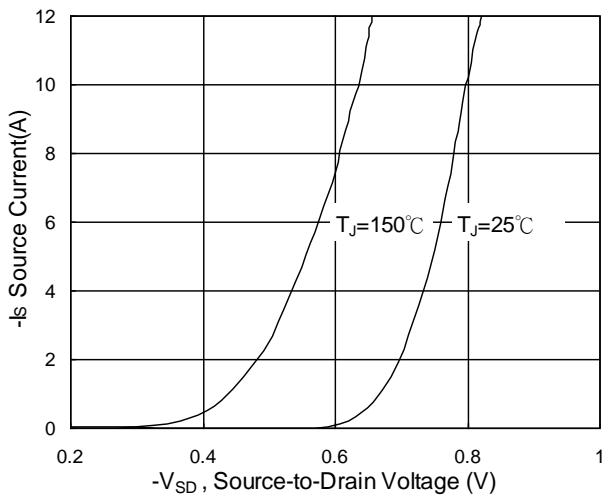
**Typical Characteristics**



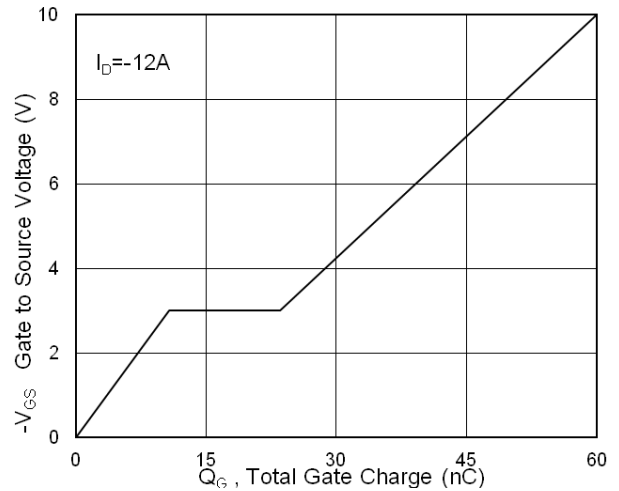
**Fig.1 Typical Output Characteristics**



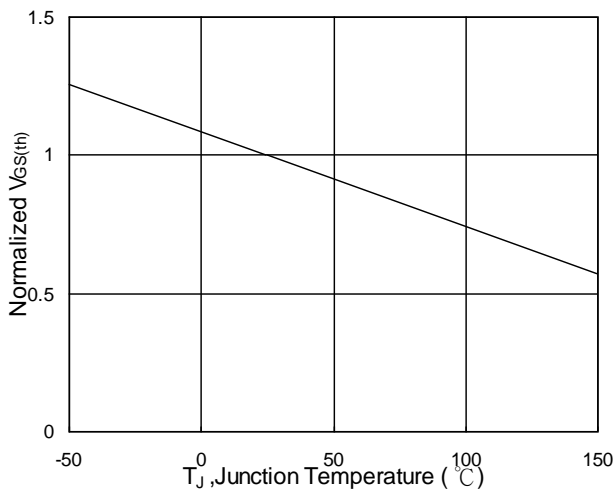
**Fig.2 On-Resistance v.s Gate-Source**



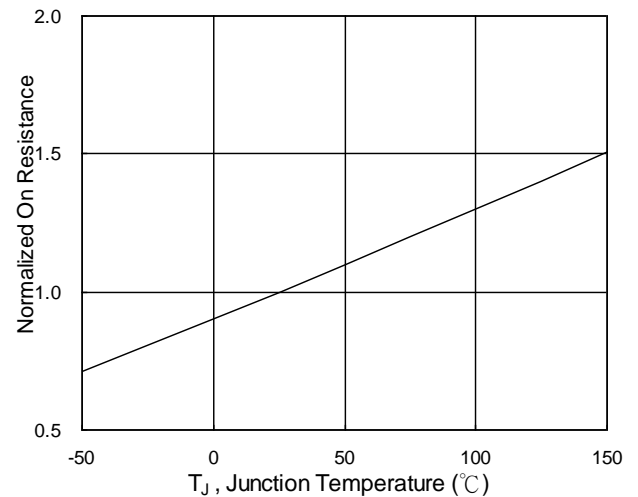
**Fig.3 Forward Characteristics Of Reverse**



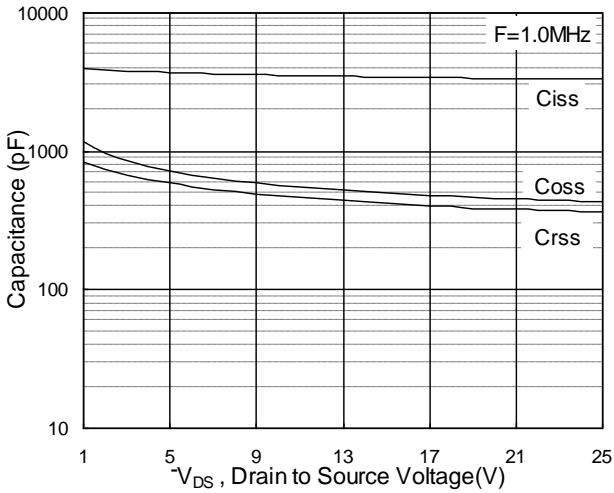
**Fig.4 Gate-Charge Characteristics**



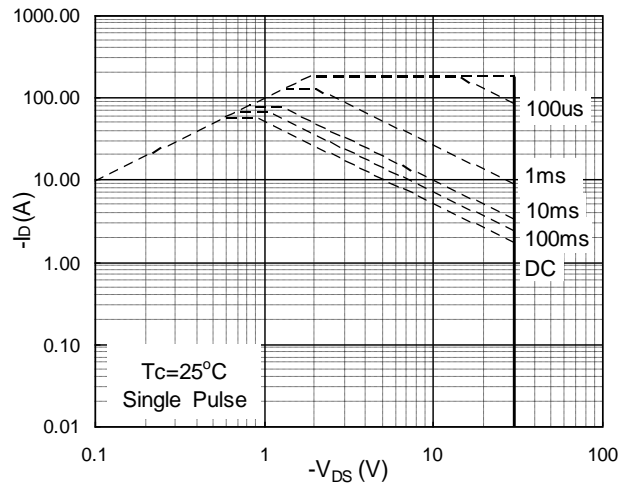
**Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$**



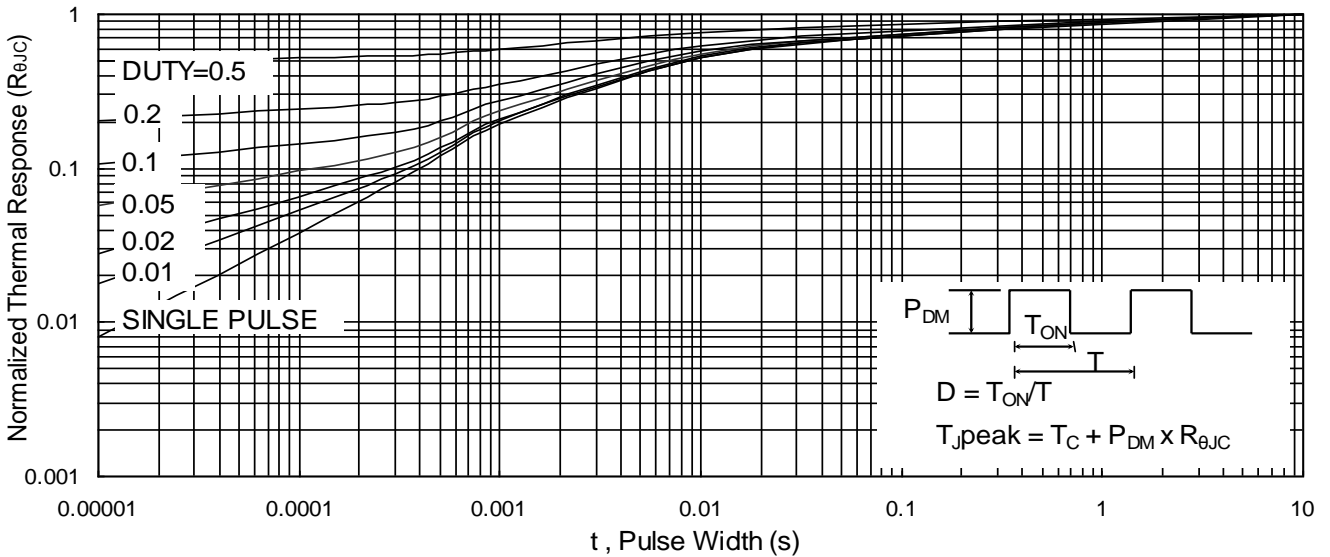
**Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$**



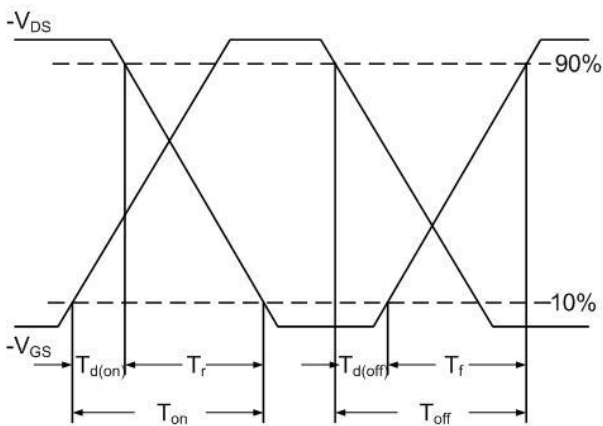
**Fig.7 Capacitance**



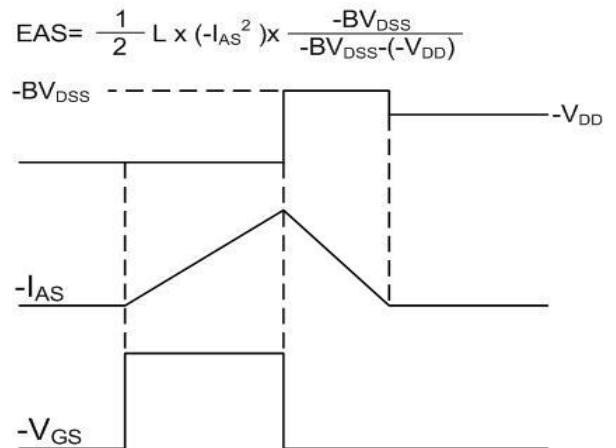
**Fig.8 Safe Operating Area**



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

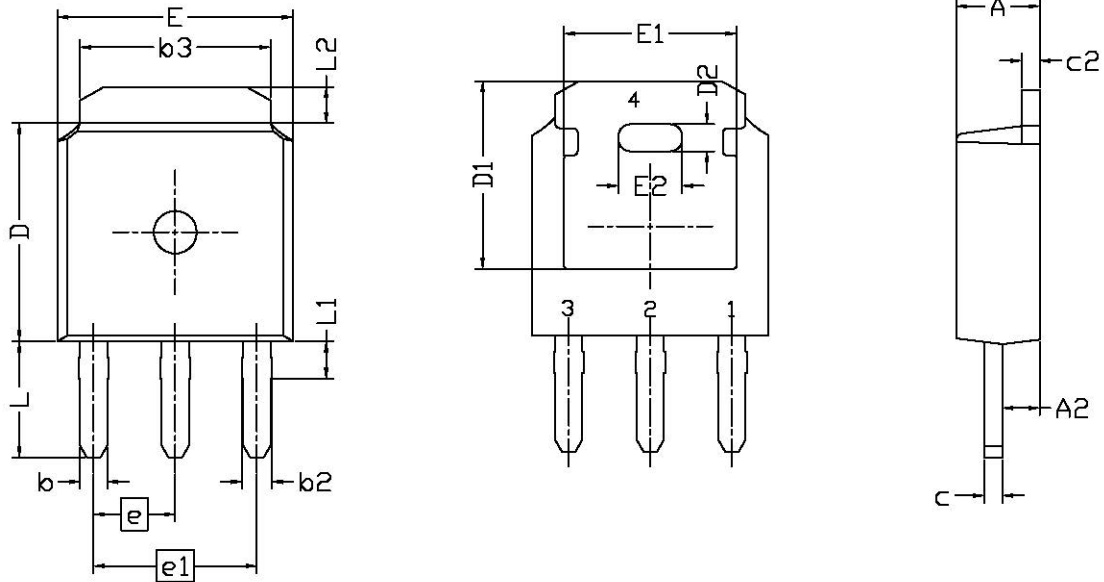


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

**TO-251 Package Outline Dimensions**



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
<b>A</b>	2.20	2.30	2.39	<b>A2</b>	0.90	1.00	1.14
<b>b</b>	0.63	0.76	0.85	<b>b2</b>	0.76	0.85	1.05
<b>b3</b>	5.10	5.40	5.60	<b>C</b>	0.46	0.51	0.61
<b>C2</b>	0.46	0.51	0.61	<b>D</b>	5.90	6.10	6.30
<b>D1</b>	5.25 REF			<b>D2</b>	0.508 BSC		
<b>E</b>	6.35	6.55	6.70	<b>E1</b>	5.06 REF		
<b>E2</b>	1.524 BSC			<b>e</b>	2.29 BSC		
<b>e1</b>	4.57 BSC			<b>L</b>	3.70	4.00	4.40
<b>L1</b>	1.15 REF			<b>L2</b>	0.90	1.06	1.20