

**Features**

- Fast switching
- Low Gate Charge
- Improved dv/dt capability
- 100% avalanche tested
- Green Device Available

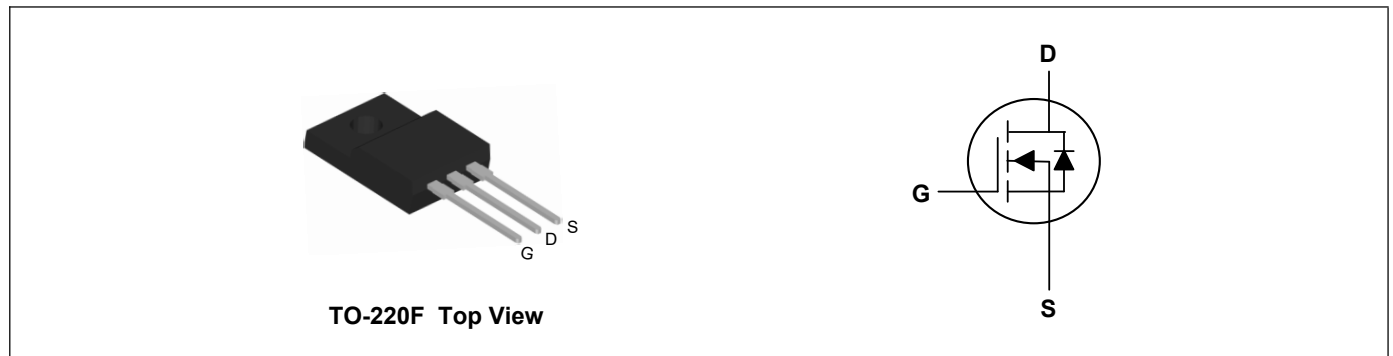
**Product Summary**



$V_{DS}$	650	V
$I_D$	10	A
$R_{DS(ON)}$ Typ (at $V_{GS}=10V$ )	0.8	$\Omega$

**Applications**

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- AC to DC Converters



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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current <sup>1</sup>	$I_D@T_C=25^\circ C$	10	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	40	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	720	mJ
Total Power Dissipation <sup>4</sup>	$P_D$	65	W
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62.5	$^\circ C/W$
Thermal Resistance Junction-Case	$R_{\theta JC}$	2.07	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
Static Drain-Source On-Resistance <sup>2</sup>	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	---	0.8	1	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	---	4	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	$\pm 100$	nA
Total Gate Charge	$Q_g$	$V_{DD}=520V, V_{GS}=10V, I_D=10A$	---	38	---	nC
Gate-Source Charge	$Q_{gs}$		---	33	---	
Gate-Drain Charge	$Q_{gd}$		---	7	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=325V, R_G=25\Omega, I_D=10A$	---	23	---	ns
Rise Time	$T_r$		---	14	---	
Turn-Off Delay Time	$T_{d(off)}$		---	90	---	
Fall Time	$T_f$		---	30	---	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	1570	---	pF
Output Capacitance	$C_{oss}$		---	138	---	
Reverse Transfer Capacitance	$C_{rss}$		---	15	---	

**Drain-Source Diode Characteristics**

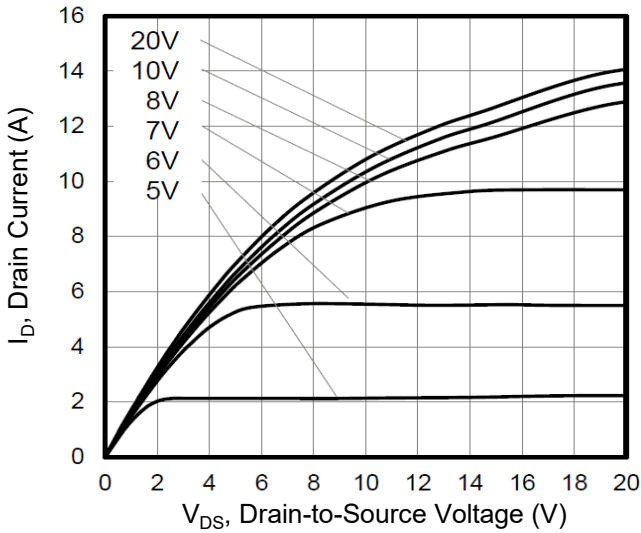
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage <sup>2</sup>	$V_{SD}$	$V_{GS}=0V, I_S=10A, T_J=25^{\circ}\text{C}$	---	---	1.5	V
Reverse recovery time	$t_{rr}$	$I_F=10A, diF/dt=100A/\mu s$	---	480	---	ns
Reverse recovery charge	$Q_{rr}$		---	3.5	---	nC

**Note:**

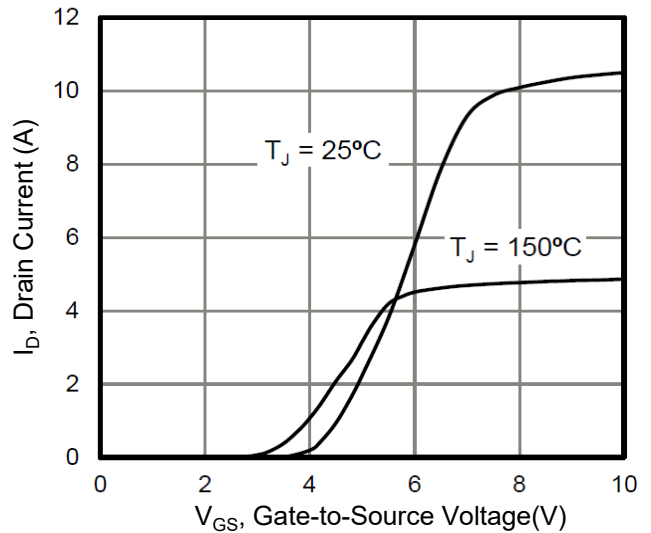
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The power dissipation is limited by 150 $^{\circ}\text{C}$  junction temperature

**Typical Characteristics**

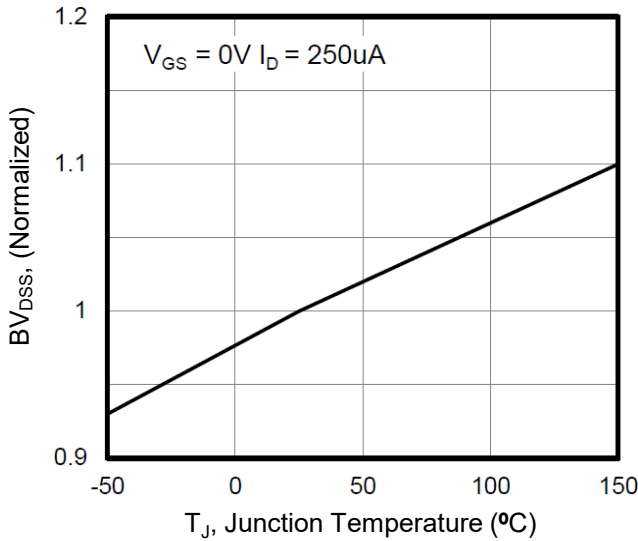
**Figure 1. Output Characteristics**



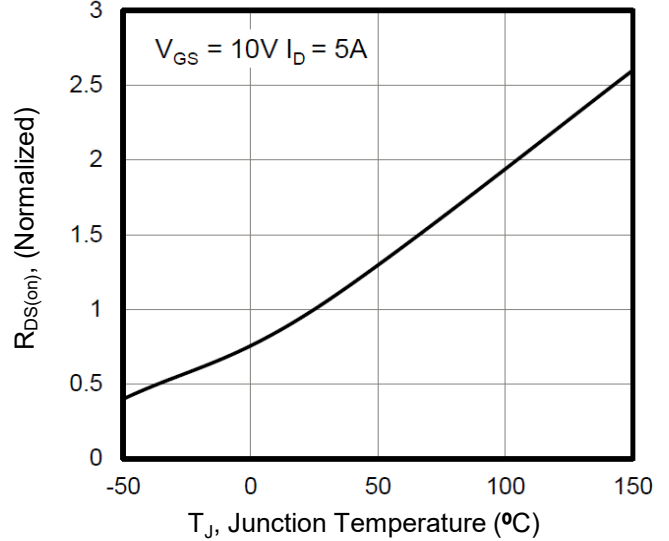
**Figure 2. Transfer Characteristics**



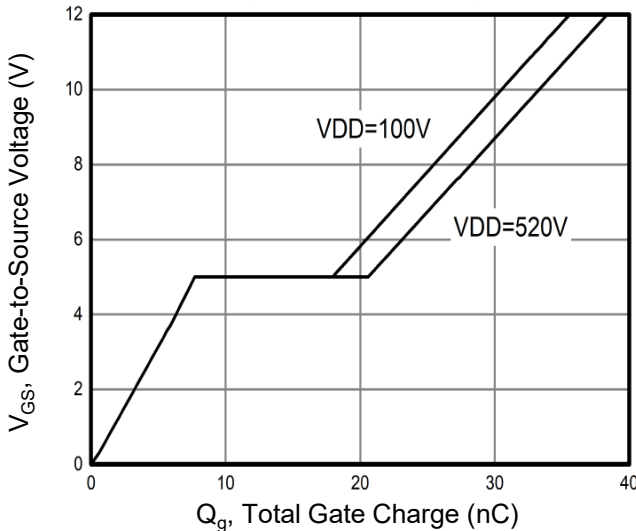
**Figure 3.  $BV_{DSS}$  vs. Temperature**



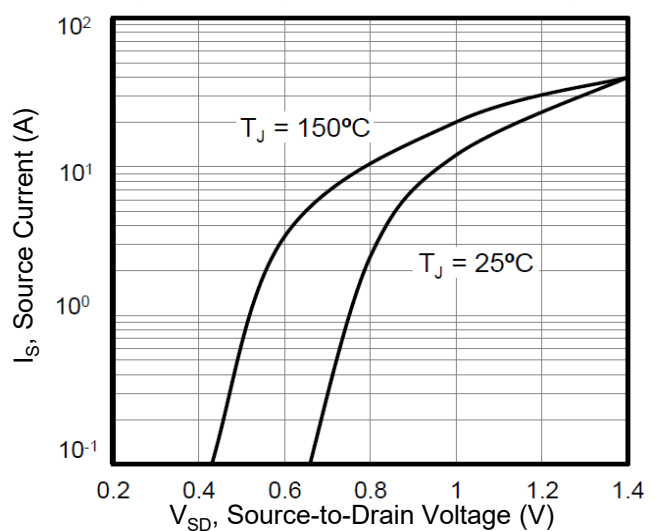
**Figure 4. On-Resistance vs. Temperature**



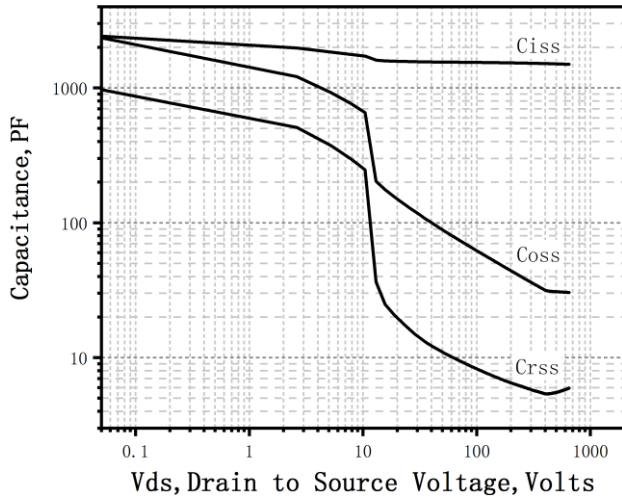
**Figure 5. Gate Charge**



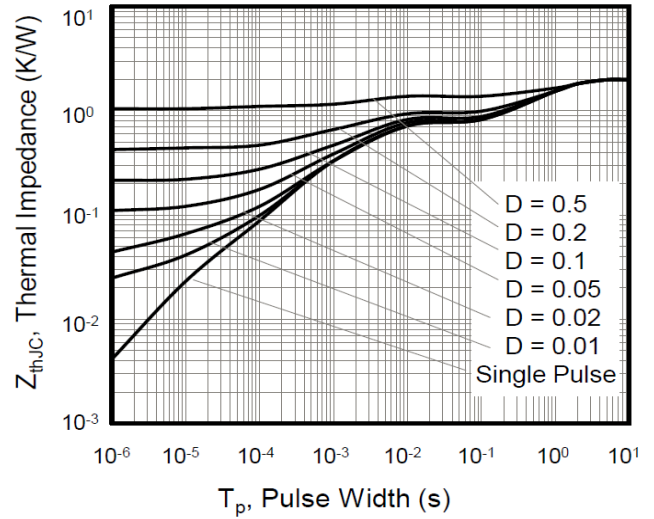
**Figure 6. Body Diode Forward Voltage**



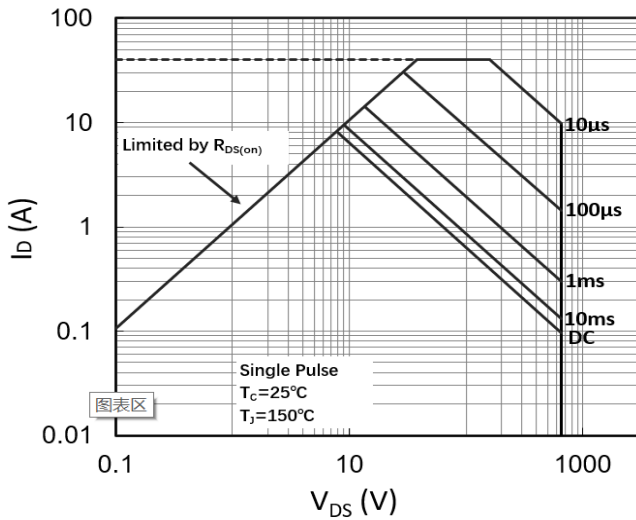
**Figure 7. Capacitance Characteristics**



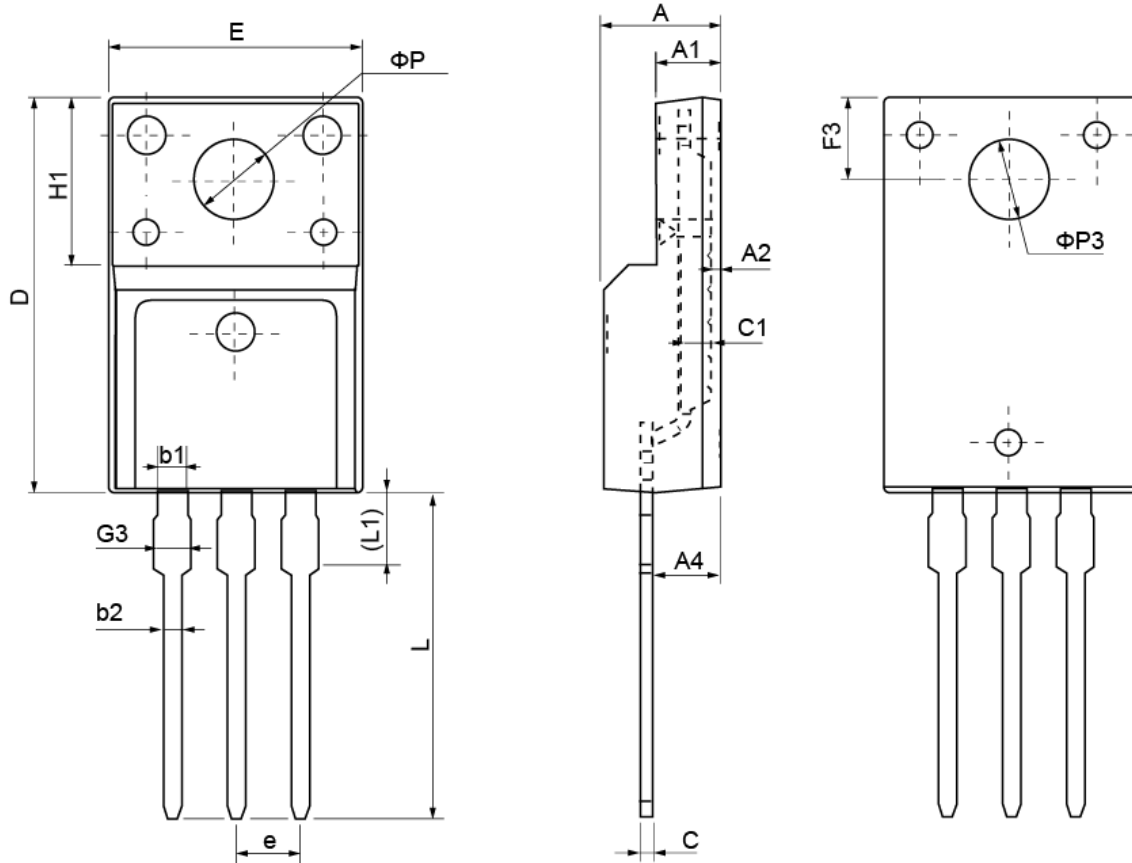
**Figure 8. Transient Thermal Impedance**



**Figure 9. Maximum Safe Operating Area**



**TO-220F Package Outline Dimensions**



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
<b>A</b>	4.40	4.70	5.00	<b>H1</b>	6.70 REF		
<b>A1</b>	2.30	2.55	2.80	<b>L</b>	12.30	12.98	13.30
<b>A2</b>	0.30	0.50	0.70	<b>L1</b>	2.95	3.10	3.50
<b>A4</b>	2.45	2.80	3.05	<b>phi P</b>	3.03	3.20	3.50
<b>c</b>	0.30	0.50	0.70	<b>phi P3</b>	3.15	3.45	3.65
<b>c1</b>	1.20	1.30	1.40	<b>b1</b>	1.10	1.30	1.45
<b>D</b>	15.40	15.90	16.40	<b>b2</b>	0.60	0.80	1.00
<b>E</b>	9.86	10.16	10.46	<b>F3</b>	3.05	3.30	3.55
<b>e</b>	2.54 BSC			<b>G3</b>	1.15	1.35	1.55

## Printing Information

ATC           =====Brand

XXXXXXX       =====Material Code

XXYY           =====XX Representative Year  
                  YY Representative Weeks