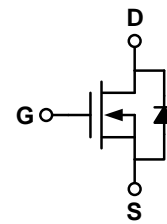
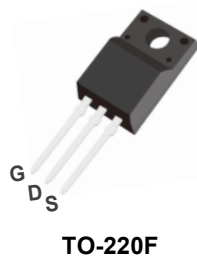


**650V N-Channel Power MOSFET**
**FEATURES**

- $BV_{DSS}$ : 650V,  $I_D=18A$
- $R_{DS(on)}$ : 0.46 $\Omega$ (Max) @  $V_{GS}=10V$
- Very Low FOM ( $R_{DS(on)} * Q_g$ )
- Excellent stability and uniformity

**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	Value	Unit
Drain-Source Voltage ( $V_{GS} = 0V$ )	$V_{DSS}$	650	V
Continuous Drain Current	$I_D$	18	A
Pulsed Drain Current (note1)	$I_{DM}$	72	A
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Single Pulse Avalanche Energy (note2)	$E_{AS}$	1520	mJ
Power Dissipation ( $T_C = 25^\circ C$ )	$P_D$	120	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	$^\circ C$

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.04	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	


**650V N-Channel Power MOSFET**
**Specifications**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

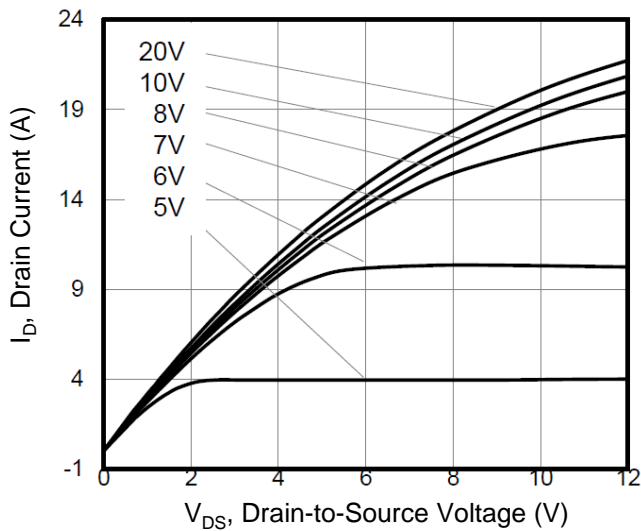
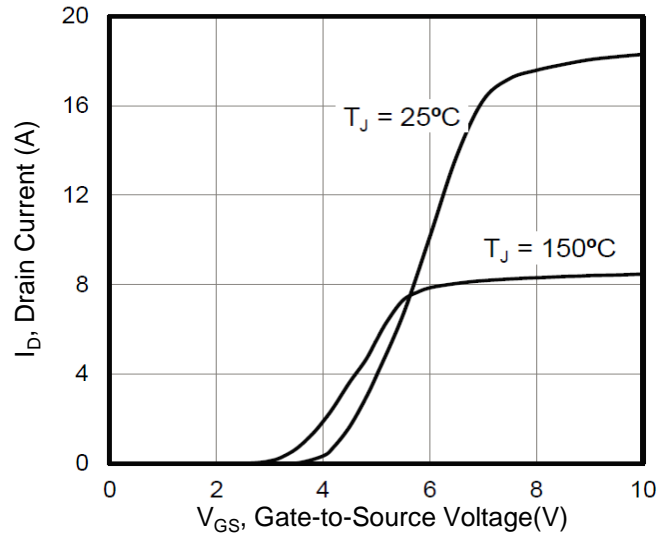
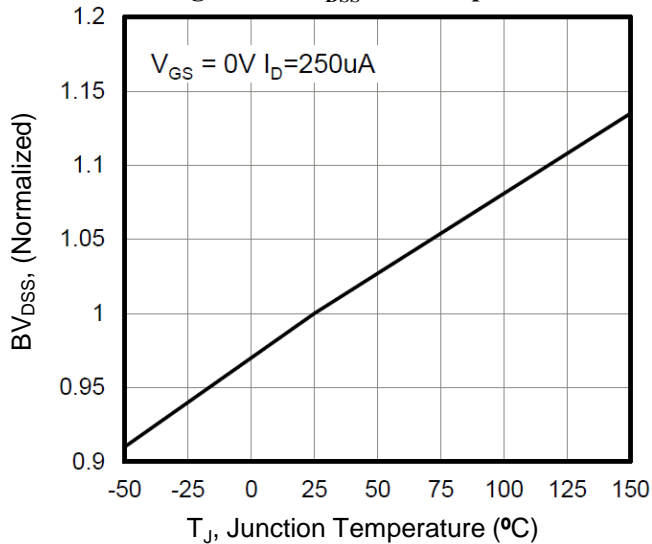
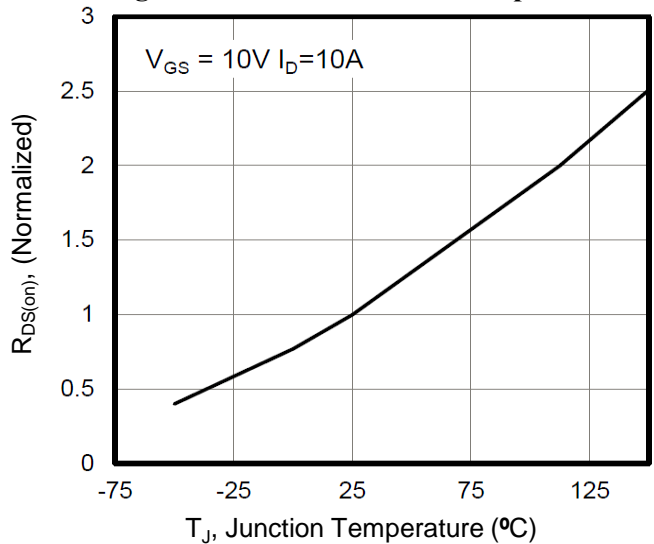
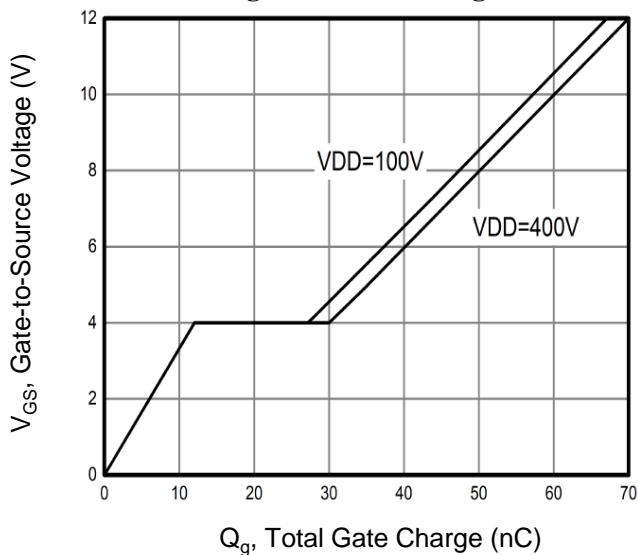
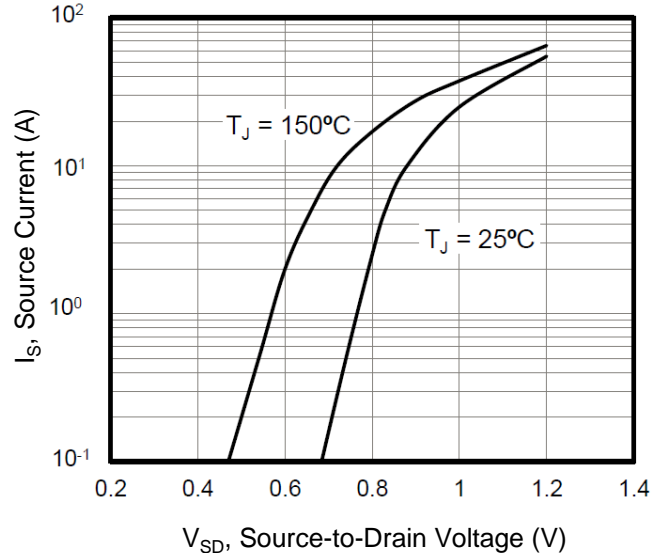
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 10A$	--	0.43	0.46	$\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	2600	--	pF
Output Capacitance	$C_{oss}$		--	230	--	
Reverse Transfer Capacitance	$C_{rss}$		--	20	--	
Total Gate Charge	$Q_g$	$V_{DD} = 520V, I_D = 18A,$ $V_{GS} = 10V$	--	65	--	nC
Gate-Source Charge	$Q_{gs}$		--	14	--	
Gate-Drain Charge	$Q_{gd}$		--	23	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 325V, I_D = 18A,$ $R_G = 25\Omega$	--	37	--	ns
Turn-on Rise Time	$t_r$		--	60	--	
Turn-off Delay Time	$t_{d(off)}$		--	162	--	
Turn-off Fall Time	$t_f$		--	80	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	18	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	72	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 10.0A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	$t_{rr}$	$V_R = 400V, I_F = 10.0A,$ $di_F/dt = 100A/\mu s$	--	450	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	6.8	--	$\mu C$

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $I_{AS} = 15A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$
4. Essentially independent of operating temperature

**650V N-Channel Power MOSFET**

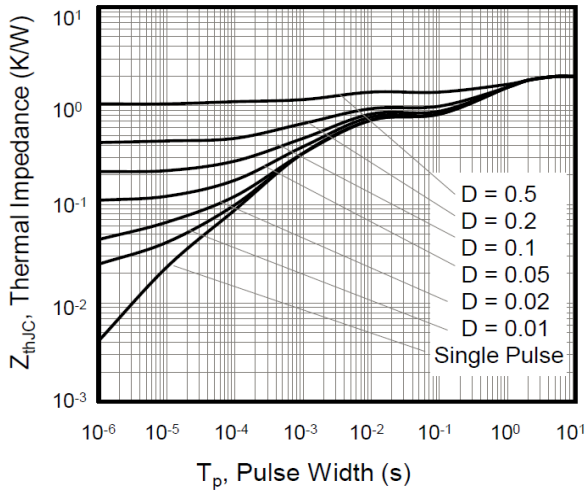
 Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

**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**


**650V N-Channel Power MOSFET**

Typical Characteristics  $T_j = 25^\circ\text{C}$ , unless otherwise noted

**Figure 7. Transient Thermal Impedance  
(TO-220F)**



**650V N-Channel Power MOSFET**
**Outline Dimension**

Unit: mm

**TO-220F**
