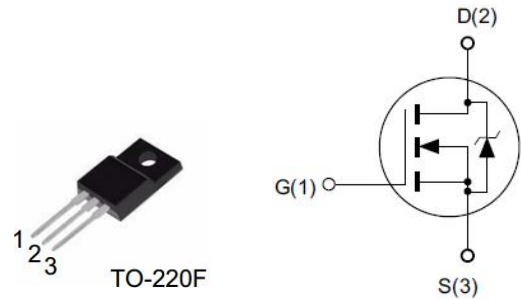


Features

- ◆ 650V, 8A, $R_{DS(ON)}(Typ.) = 0.50\Omega @ V_{GS} = 10V$.
- ◆ Advanced Super Junction Technology
- ◆ Easy to Control Gate Switching
- ◆ 100% Avalanche Tested

Application

- ◆ PD Adaptor
- ◆ LCD & PDP TV and LED lighting
- ◆ Boost PFC switch, single-ended flyback or two-transistor forward topologies



Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	650	V
V_{GS}	Gate-Source Voltage	± 30	
I_D	Drain Current-Continuous, $T_c = 25^\circ\text{C}$	8	A
I_{DM}	Drain Current-Pulsed ^b	24	
P_D	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	28	W
dv/dt	Peak Diode Recovery dv/dt	15	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	211	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	80	

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

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.8	-	4.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 4A$	-	0.50	0.55	Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_g	Gate Resistance	$f = 1.0MHz$	-	25	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 50V,$ $V_{GS} = 0V,$ $f = 10kHz$	-	599	-	pF
C_{oss}	Output Capacitance		-	76	-	
C_{rss}	Reverse Transfer Capacitance		-	3.6	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400V,$ $I_D = 3A,$ $V_{GS} = 13V,$ $R_G = 6.8\Omega$	-	26.8	-	ns
t_r	Turn-On Rise Time		-	24.8	-	
$t_{d(off)}$	Turn-Off Delay Time		-	127.6	-	
t_f	Turn-Off Fall Time		-	21.2	-	
Q_g	Total Gate Charge	$V_{DS} = 400V,$ $I_D = 3A,$ $V_{GS} = 0 \text{ to } 10V$	-	8.0	-	nC
Q_{gs}	Gate-Source Charge		-	2.6	-	
Q_{gd}	Gate-Drain Charge		-	1.7	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	8	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	24	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_F = 1A$	-	0.76	-	V
T_{rr}	Body Diode Reverse Recovery Time	$V_R = 400V, I_F = 3A,$ $di_F/dt = 100A/\mu s$	-	174	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$V_R = 400V, I_F = 3A,$ $di_F/dt = 100A/\mu s$	-	1.2	-	μC

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- $L = 10mH, V_{DD} = 100V, I_{AS} = 6.5A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.

■ Characteristic Curve

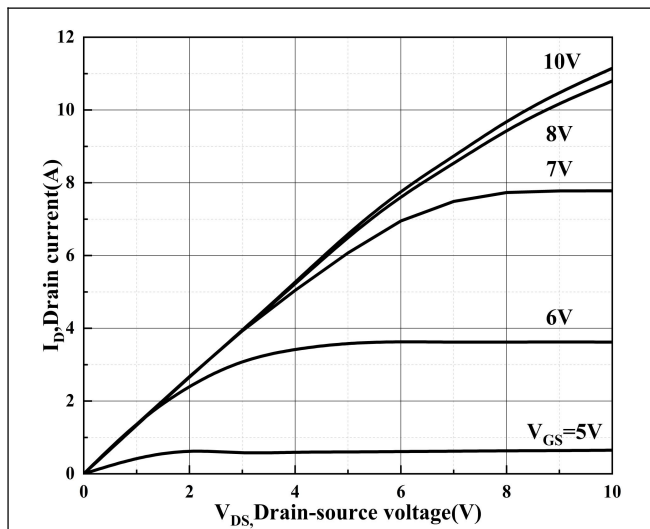


Figure 1. Typical Output Characteristics

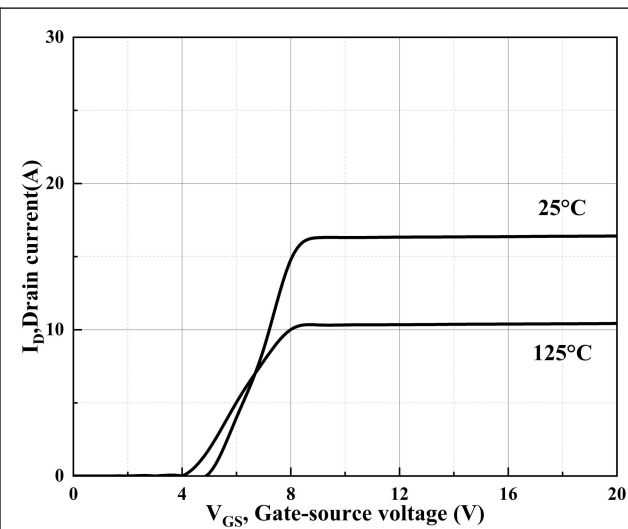


Figure 2. Typical Transfer Characteristics

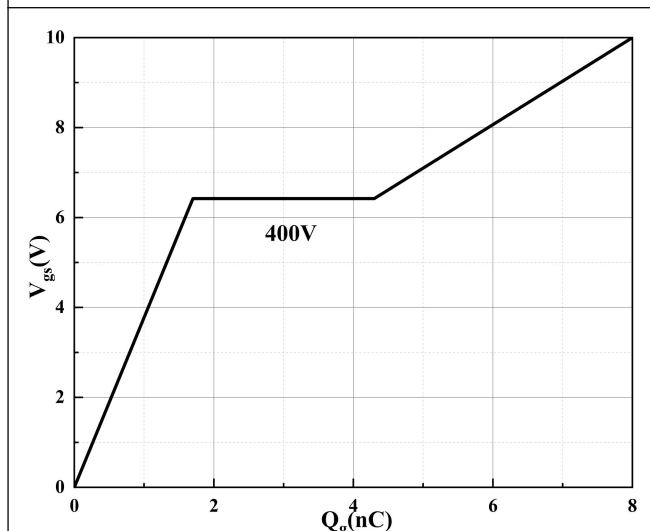


Figure 3. Typical Gate-Charge Characteristics

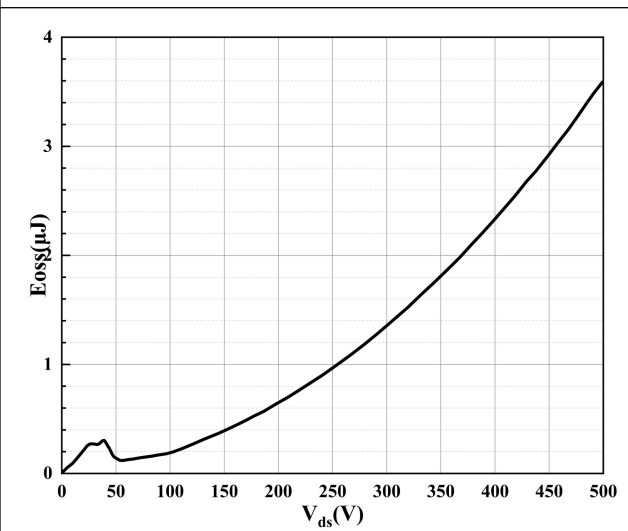


Figure 4. Typical Coss Stored Energy

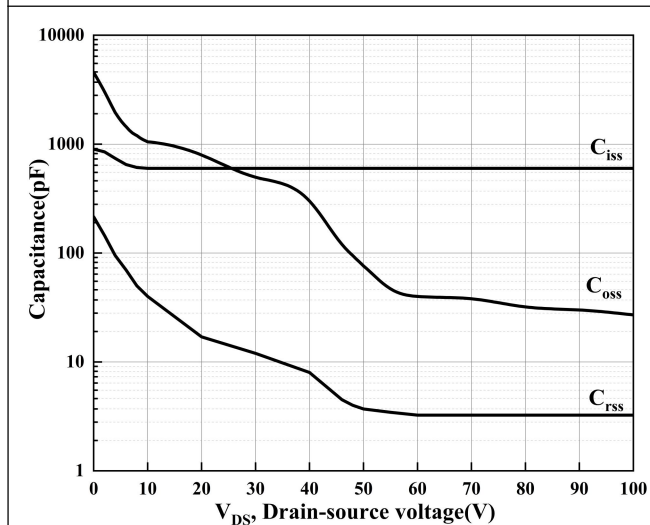


Figure 5. Typical Capacitance

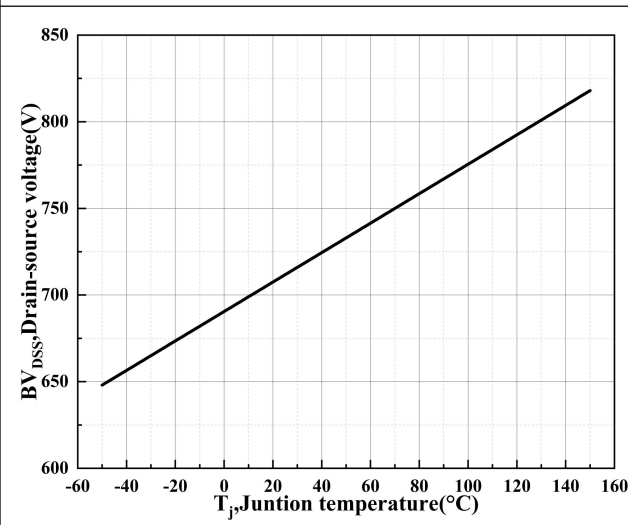
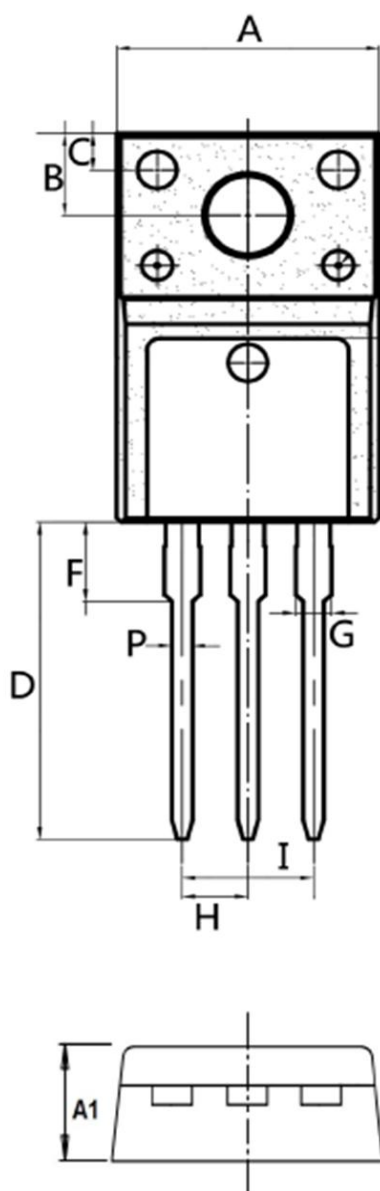


Figure 6. Drain-source Breakdown Voltage

■ Package Information

TO-220F



Dim.	Min.	Max.
A	9.95	10.25
A1	4.5	5.0
B	2.95	3.25
C	1.25	1.45
D	12.80	13.20
E	0.40	0.60
F	2.8	3.5
G	1.30	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.60	4.75
K	2.45	2.65
L	6.5	6.8
M	15.4	16.0
N	2.75	3.05
O	0.45	0.55
P	0.70	0.90
All Dimensions in millimeter		