

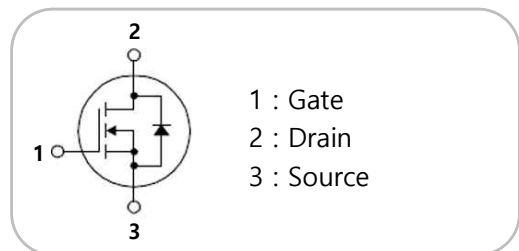

**General description**

Symbol	Value
$V_{DSS}$ @ $T_C=25^\circ\text{C}$	Min 650V
$I_D$ @ $T_C=25^\circ\text{C}$	20A
$R_{DS(on)}$	Max 200mΩ
$Q_G$	Typ 35nC


**Package**


**Features**

- Gate Charge(Typ.  $Q_g=35$  nC)
- Improved dv/dt Capability
- 100% Avalanche Tested



**Applications**

- LCD/LED/PDP TV
- Telecom/Server Power supplies
- AC-DC Power Supply
- LED Lighting


**Maximum Ratings ( $T_C = 25^\circ\text{C}$ )**

Parameter	Symbol	Test Condition	Value	Units
Drain - source voltage	$V_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	V
Drain current	$I_D$	$T_C=25^\circ\text{C}$	20	A
Drain current	$I_{DM}$	Pulse width limited by junction temperature	40	A
Gate-source voltage	$V_{GS}$	-	$\pm 30$	V
Single pulsed avalanche energy	$E_{AS}$	$I_{AS}=9.0A, R_G=25\Omega, V_{DD}=50V, L=20mH$	810	mJ
Power dissipation	$P_D$	$T_C=25^\circ\text{C}$	33	W
Operating junction	$T_j$	-	-55 to 150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-	-55 to 150	$^\circ\text{C}$




**Electrical Characteristics ( $T_j = 25^\circ\text{C}$ )**

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=1mA$	650	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$	-	-	30	μA
Gate-source leakage current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	±70	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3	-	5	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	-	190	200	mΩ
Gate input resistance	$R_G$	$V_{GS}=0V, f=100kHz$	-	4	5	Ω
Input capacitance	$C_{iss}$	$V_{DS}=380V, V_{GS}=0V$ $f=100kHz$	-	2000	-	pF
Output capacitance	$C_{oss}$		-	1500	-	
Reverse transfer capacitance	$C_{rss}$		-	20	-	
Total gate charge at 10V	$Q_{G(tot)}$	$V_{DS}=380V, I_D=10A,$ $V_{GS(on)}=10V, V_{GS(off)}=0V$	-	35	-	nC
Gate-source charge	$Q_{GS}$		-	10	-	
Gate-drain charge	$Q_{GD}$		-	20	-	
Turn on delay time	$t_{d(on)}$	$V_{DS}=380V, I_D=10A,$ $V_{GS}=10V, R_G=4.7\Omega$	-	18	-	ns
Rise time	$t_r$		-	20	-	
Turn off delay time	$t_{d(off)}$		-	64	-	
Fall time	$t_f$		-	21	-	

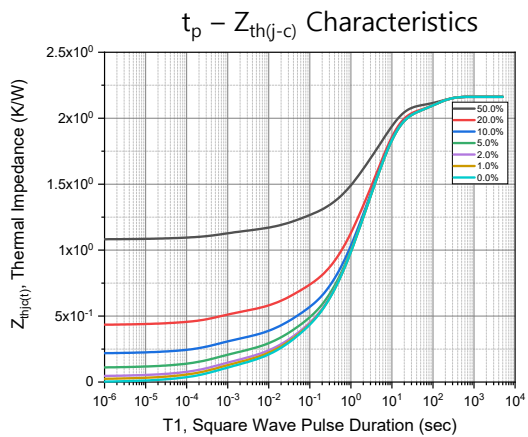


**Body Diode(Source – Drain) Electrical Characteristics (T<sub>j</sub> = 25°C)**

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Continuous diode forward current	I <sub>S</sub>	-	-	-	20.0	A
Maximum pulsed drain to source diode forward current	I <sub>SM</sub>	-	-	-	80.0	
Forward voltage	V <sub>SD</sub>	I <sub>SD</sub> =10A, V <sub>GS</sub> =0V	-	-	1.2	V
Reverse recovery time	t <sub>rr</sub>	I <sub>SD</sub> =10A, V <sub>GS</sub> =0V di/dt=100A/μs	-	330.0	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	4.8	-	nC
Peak reverse recovery current	I <sub>rrm</sub>		-	29.0	-	A

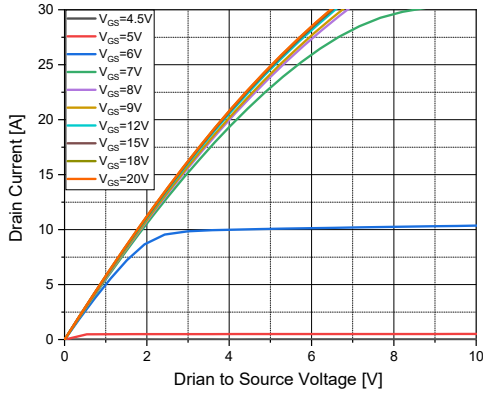
**Thermal Characteristics(T<sub>c</sub> = 25°C)**

Symbol	Parameter	Typ	Max	Units
R <sub>th(j-c)</sub>	Junction to case	3.75	-	°C/W

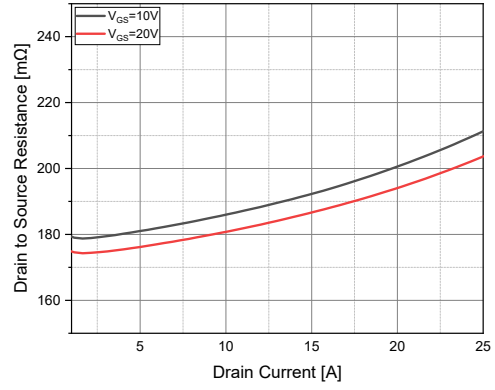


**Typical Electrical Characteristics Curves ( $T_j = 25^\circ\text{C}$ )**

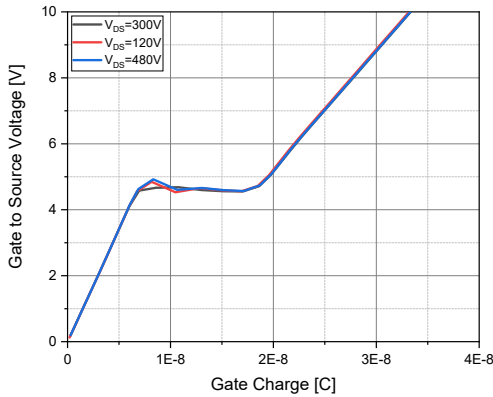
$V_{DS} - I_D$  Characteristics,  $T_j=25^\circ\text{C}$



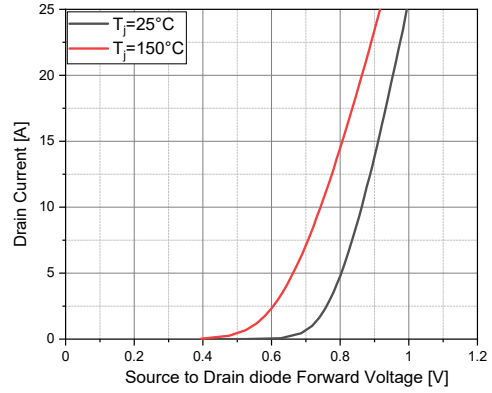
$I_D - R_{DS(on)}$  Characteristics



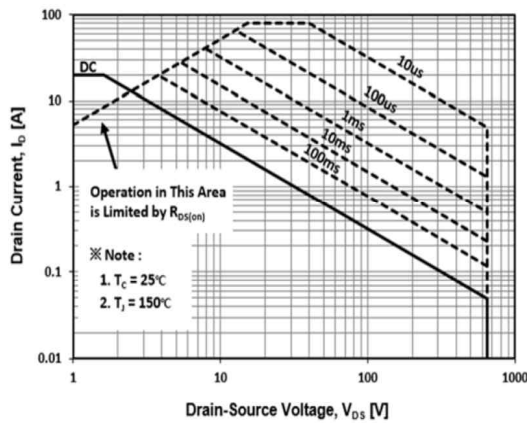
$Q_g - V_{GS}$  Characteristics



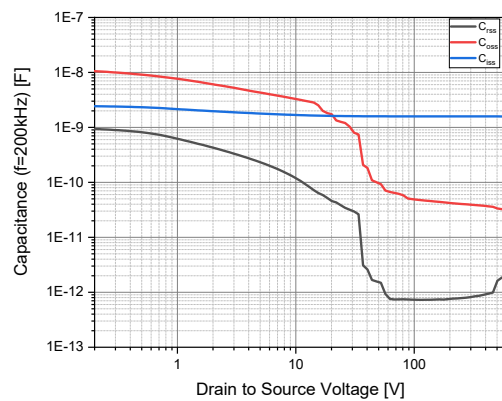
$V_{SD} - I_D$  Characteristics



Safe Operating Area,  $T_c=25^\circ\text{C}$

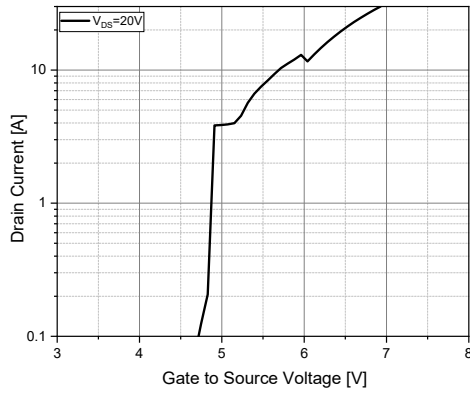


$V_{DS} - C$  Characteristics

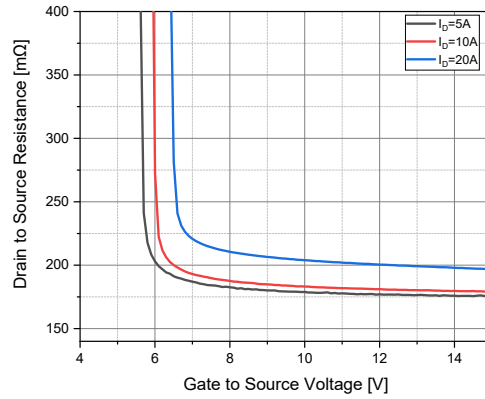


**Typical Electrical Characteristics Curves ( $T_j = 25^\circ\text{C}$ )**

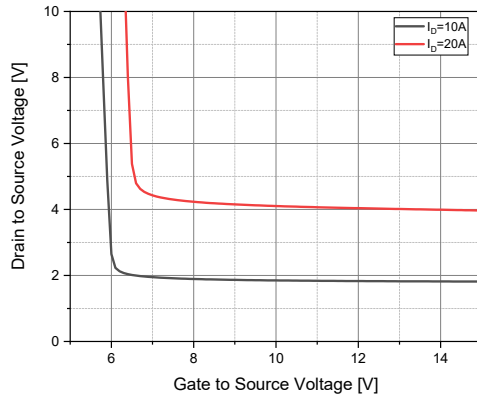
$V_{GS} - I_D$  Characteristics,  $T_j=25^\circ\text{C}$



$V_{GS} - R_{DS(on)}$  Characteristics

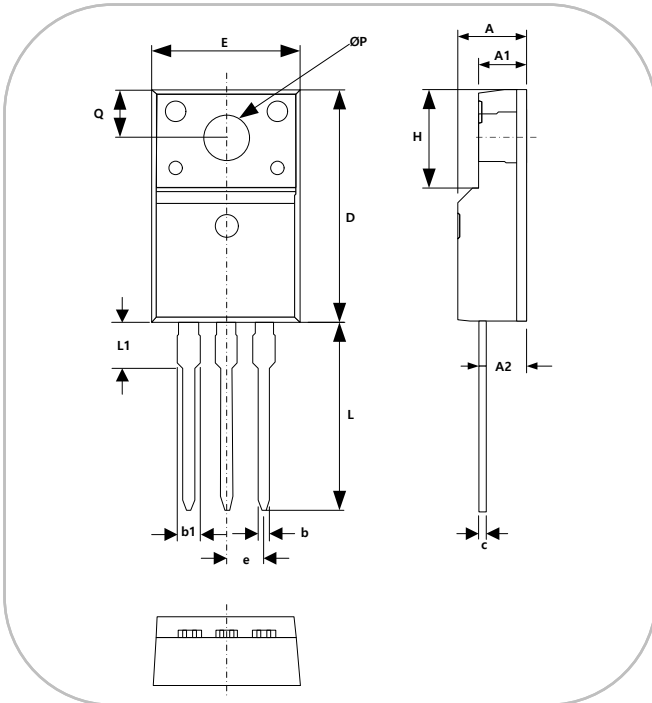


$V_{GS} - V_{DS}$  Characteristics



**Package Dimensions(TO-220F)**

[Unit : mm]



SYMBOL	MIN	MAX
A	4.50	4.90
A1	2.34	2.74
A2	2.56	2.96
b	0.70	0.90
b1	1.27	1.47
c	0.45	0.60
D	15.67	16.07
E	9.96	10.36
e	2.54 BSC	
H	6.48	6.88
L	12.68	13.28
L1	3.03	3.43
φP	3.08	3.28
Q	3.20	3.40
A	4.50	4.90
A1	2.34	2.74
A2	2.56	2.96
b	0.70	0.90

**Marking Information**

