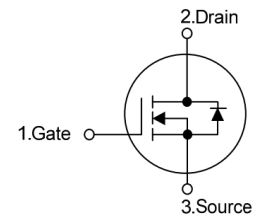


# 11A,650V N-CHANNEL SUPER JUNCTION MOSFET

## Features

- $R_{DS(on)}=0.38\Omega$  (Max.) @  $V_{GS}=10V, I_D=5.5A$
- New technology for high voltage device
- Low on-resistance
- Fast switching



## Applications

- Power factor correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible Power Supply (UPS)

## Key Performance and Package Parameters

Order codes	$V_{DS}$	$I_D$	$R_{DS(ON)}$ , Typ	$T_{vjmax}$	Marking	Package
XD380J065BX1H3	650V	11A	0.33 $\Omega$	150 $^{\circ}C$	D380J65BX1	TO220F

## Absolute Maximum Ratings (T<sub>c</sub>= 25 $^{\circ}C$ unless otherwise noted.)

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-Source Voltage	650	V
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current ( T <sub>C</sub> =25 $^{\circ}C$ )	11	A
$I_{DM}$	Pulsed Drain Current	44	A
$P_D$	Maximum Power Dissipation ( T <sub>C</sub> =25 $^{\circ}C$ )	40	W
$E_{AS}$	Avalanche Energy, Single Pulse (note1)	362	mJ
$T_J$	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}C$

## Thermal Data

Symbol	Parameter	Conditions	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO220F	3.18	$^{\circ}C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	650	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	---	---	1	$\mu A$
$I_{GSS}$	Gate Leakage Current, Forward	$V_{GS}=30V, V_{DS}=0V$	---	---	100	nA
	Gate Leakage Current, Reverse	$V_{GS}=-30V, V_{DS}=0V$	---	---	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=5.5A$	--	0.33	0.38	$\Omega$
$Q_g$	Total Gate Charge	$V_{DS}=520V$	---	22	---	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS}=10V$	---	5	---	nC
$Q_{gd}$	Gate-Drain Charge	$I_{DS}=11A$	---	9.2	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=325V, V_{GS}=10V$ $I_{DS}=11A, R_G=10\Omega$	---	13	---	ns
$t_r$	Turn-on Rise Time		--	10	--	ns
$t_{d(off)}$	Turn-off Delay Time		---	46	---	ns
$t_f$	Turn-off Fall Time		---	9.6	---	ns
$C_{iss}$	Input Capacitance	$V_{DS}=50V$	---	898	---	pF
$C_{oss}$	Output Capacitance	$V_{GS}=0V$	---	197	---	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1\text{MHz}$	---	9.5	---	pF

**Diode Characteristics** ( $T_c=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Diode Forward Voltage	$I_{SD}=11A, V_{GS}=0V$	---	0.9	1.3	V
$t_{rr}$	Diode Reverse Recovery Time	$I_{SD}=11A,$ $di/dt=100A/s$	---	252	---	ns
$Q_{rr}$	Diode Reverse Recovery Charge		---	3.1	---	$\mu C$

**Notes:**

1.  $V_{DD}=50V, V_G=10V, I_{AS}=11A, R_G=25\Omega$ , starting,  $T_J=25^\circ\text{C}$ .

## Typical Characteristics

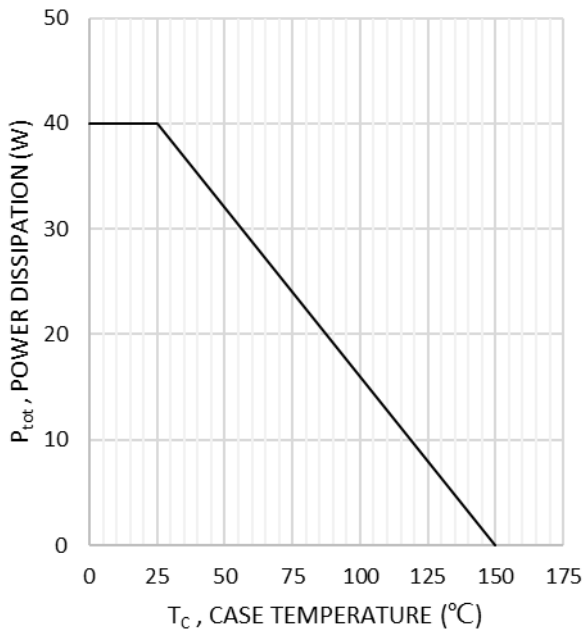


Fig.1 Power Dissipation

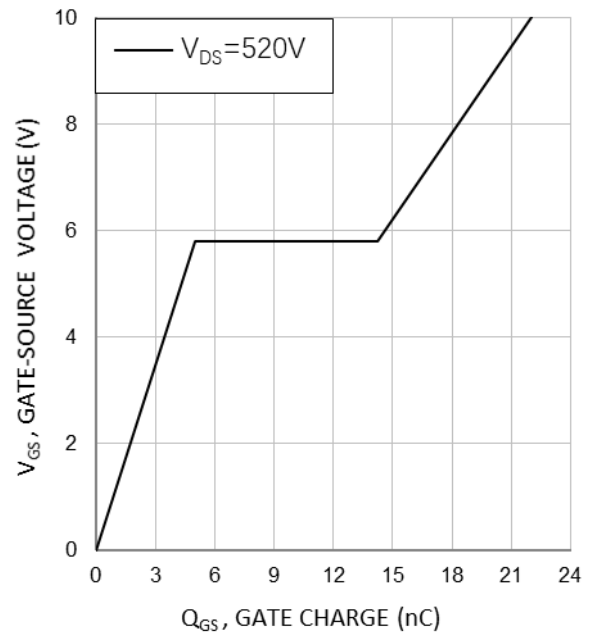


Fig.2 Gate Charge

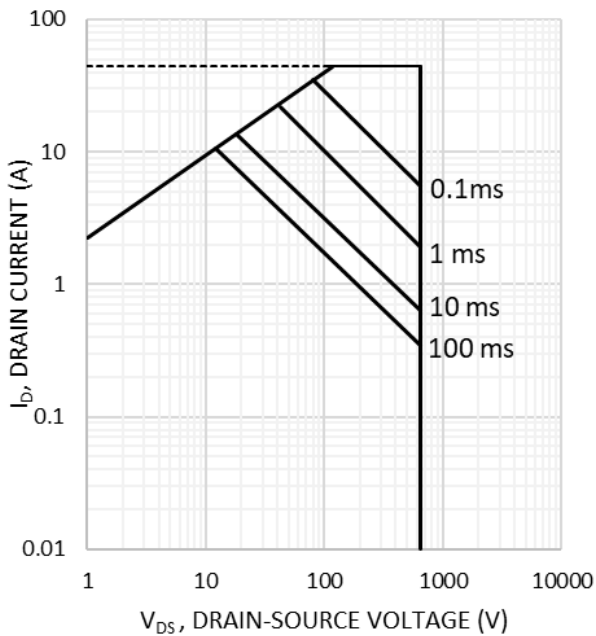


Fig.3 Safe Operation Area

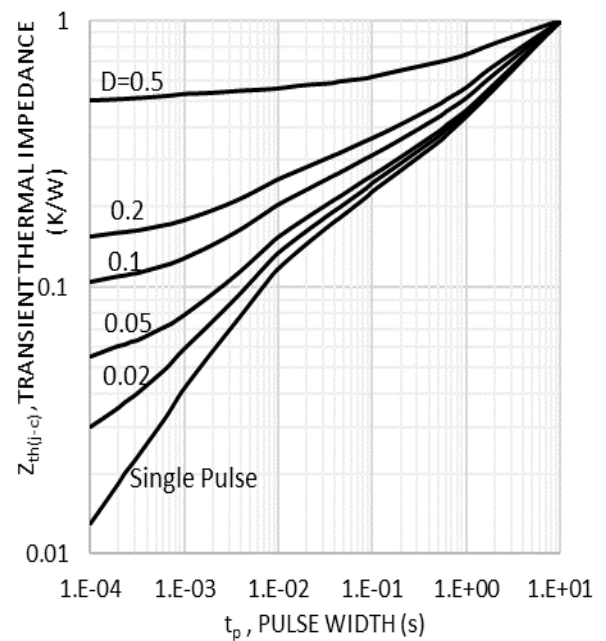


Fig.4 Thermal Transient Impedance

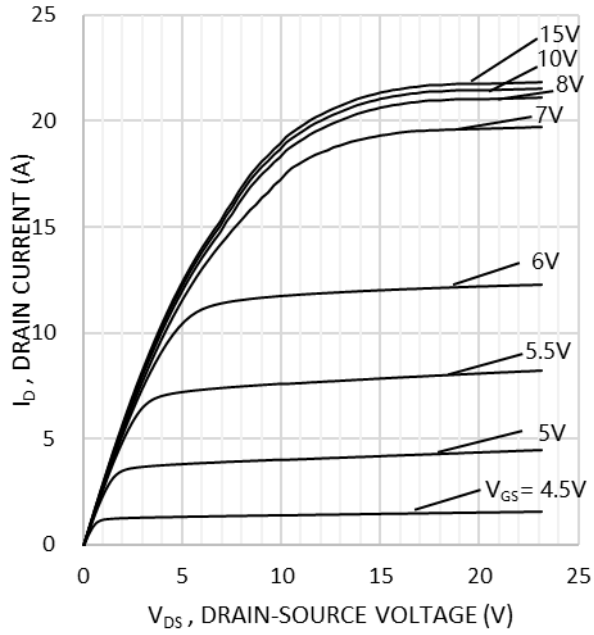


Fig.5 Output Characteristics

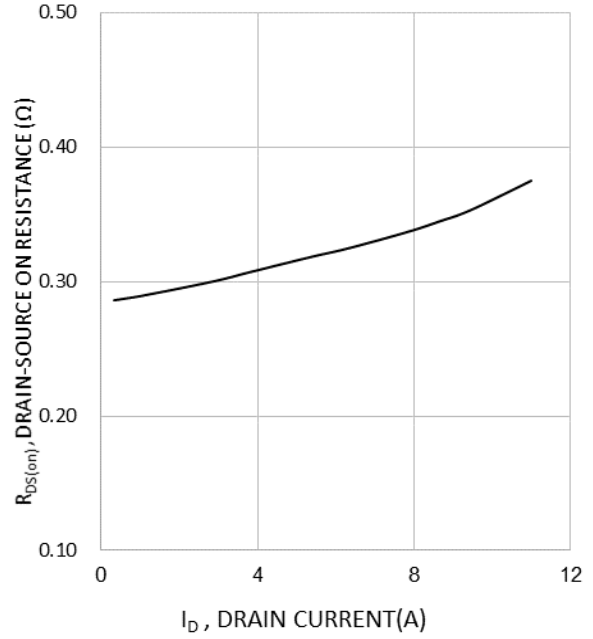


Fig.6 Drain-Source On Resistance

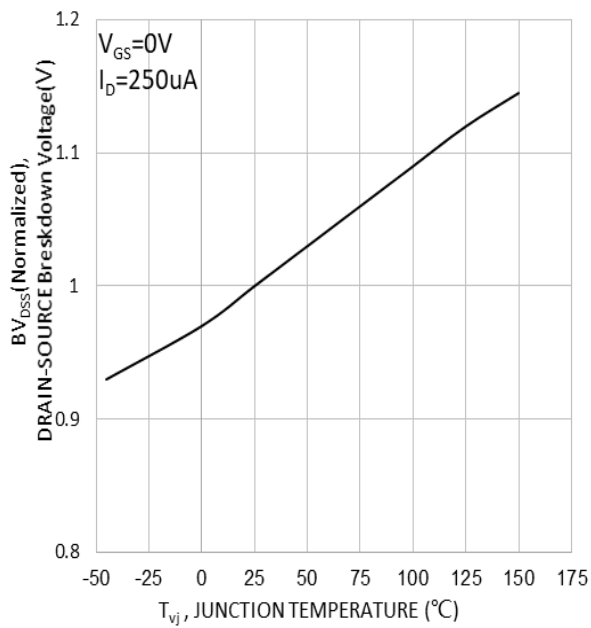


Fig.7 Drain-Source Breakdown Voltage

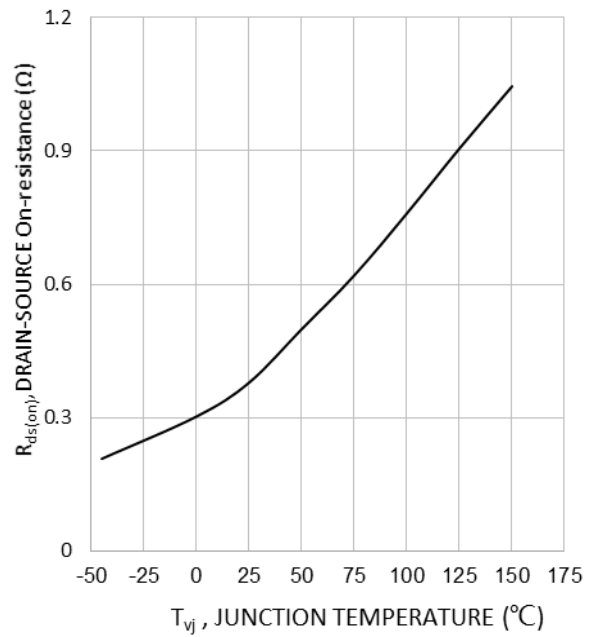


Fig.8 Drain-Source On Resistance

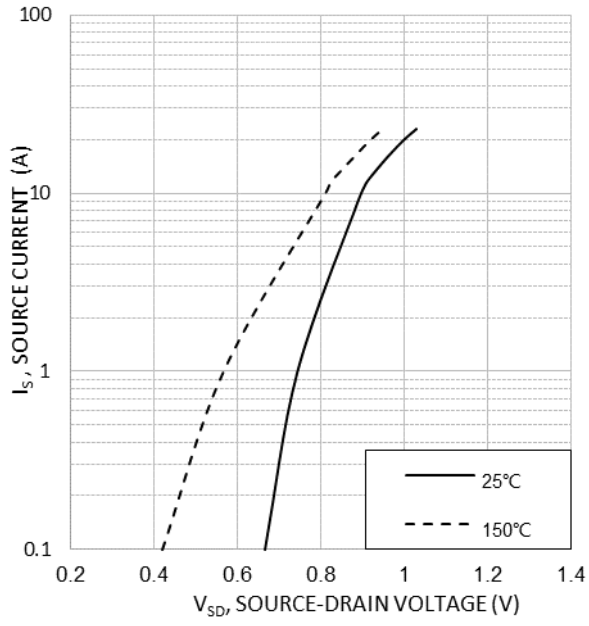


Fig.9 Source-Drain Diode Forward Current

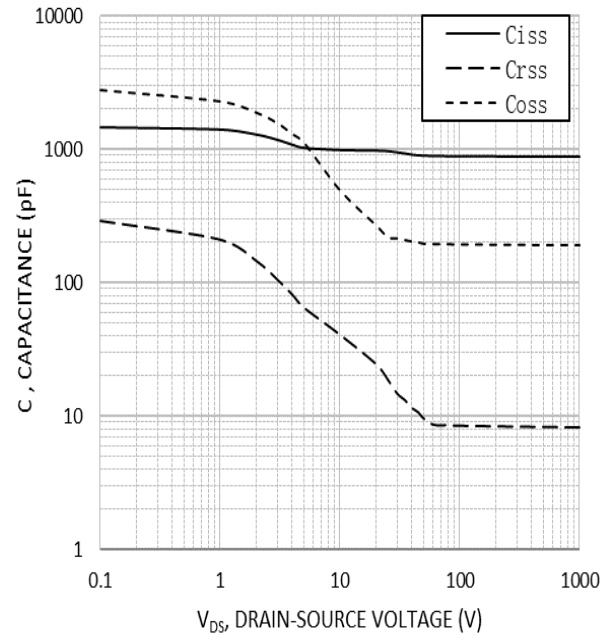
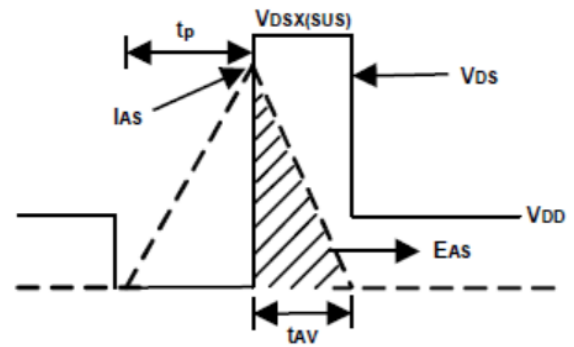
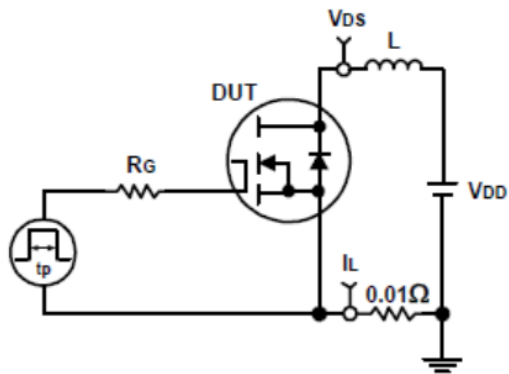
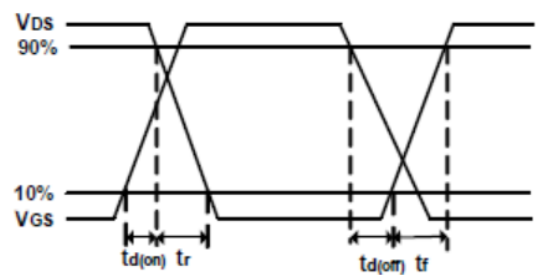
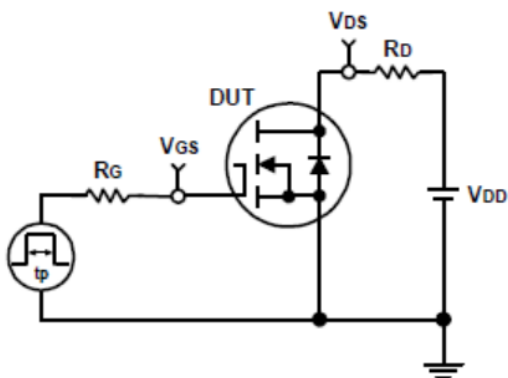


Fig.10 Capacitance

### Avalanche Test Circuit and Waveforms

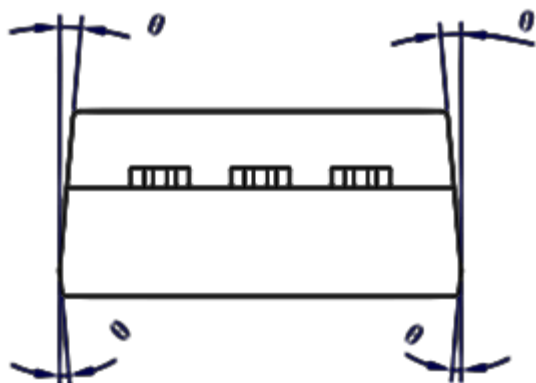
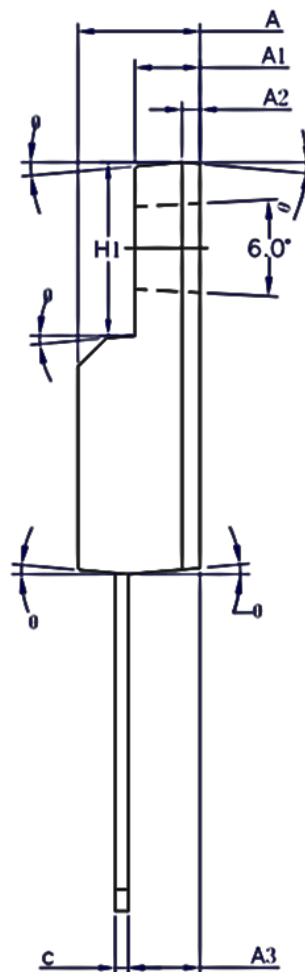
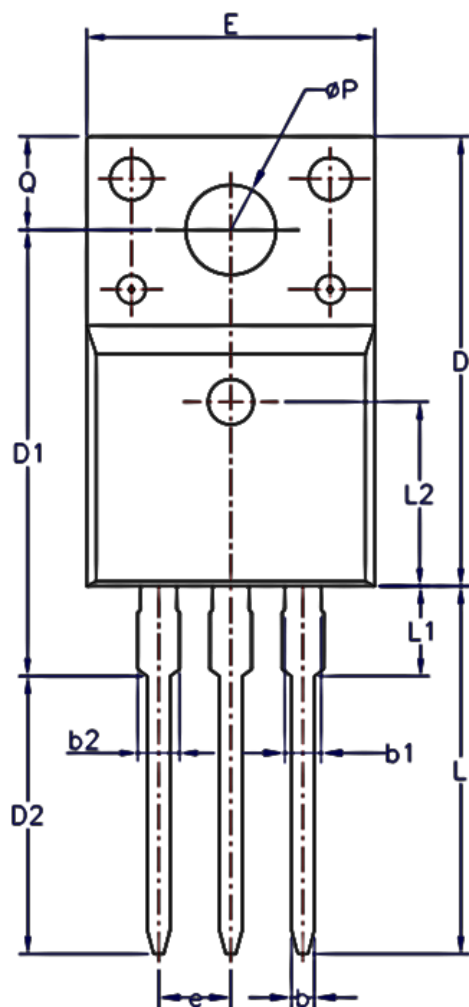


### Switching Time Test Circuit and Waveforms



Package Information

TO-220F-3L



SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.70	-	0.90
b1	1.18	-	1.38
b2	-	-	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e	2.54BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2	6.50REF		
∅P	3.08	3.18	3.28
Q	3.20	-	3.40
θ1	1°	3°	5°