

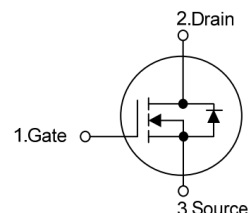
20A,800V N-CHANNEL Power MOSFET

Features

- $R_{DS(on)}=0.22\Omega$ (Max.) @ $V_{GS}=10V, I_D=20A$
- 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
XD020M080AP1L3	800V	20A	0.22 Ω	150 $^{\circ}C$	D20M80AP1	TO220

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

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	800	V
V_{GSS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current ($T_c=25^{\circ}C$)	20	A
I_{DM}	Pulsed Drain Current	62	A
P_D	Maximum Power Dissipation ($T_c=25^{\circ}C$)	205	W
E_{AS}	Avalanche Energy, Single Pulse (note1)	485	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)	TO220	0.83	$^{\circ}C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_{DS} = 250\mu A$	800	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 800V, V_{GS} = 0V$	---	---	1	μA
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	$V_{DS} = V_{GS}, I_{DS} = 250\mu A$	2.5	3.5	4.5	V
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS} = 10V, I_{DS} = 10A$	--	0.22	0.24	Ω
Q_g	Total Gate Charge	$V_{DS} = 480V$	---	70	---	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10V$	---	7.8	---	nC
Q_{gd}	Gate-Drain Charge	$I_{DS} = 10A$	---	0	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 400V, V_{GS} = 10V$ $I_{DS} = 10A, R_G = 3.3\Omega$	---	25	---	ns
t_r	Turn-on Rise Time		--	55	--	ns
$t_{d(off)}$	Turn-off Delay Time			70	---	ns
t_f	Turn-off Fall Time		---	40	---	ns
C_{iss}	Input Capacitance	$V_{DS} = 25V$	---	1400	---	pF
C_{oss}	Output Capacitance	$V_{GS} = 0V$	---	350	---	pF
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$	---	20	---	pF

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	$I_{SD} = 20A, V_{GS} = 0V$	---	1.0	1.45	V
t_{rr}	Diode Reverse Recovery Time	$I_{SD} = 10A,$ $di_f/dt = 100A/\mu s$	---	475	---	ns
Q_{rr}	Diode Reverse Recovery Charge		---	5.8	---	μC

Notes:

1. $V_{DD} = 50V, I_{AS} = 3.5A$, starting $T_J = 25^\circ\text{C}$.

Typical Characteristics

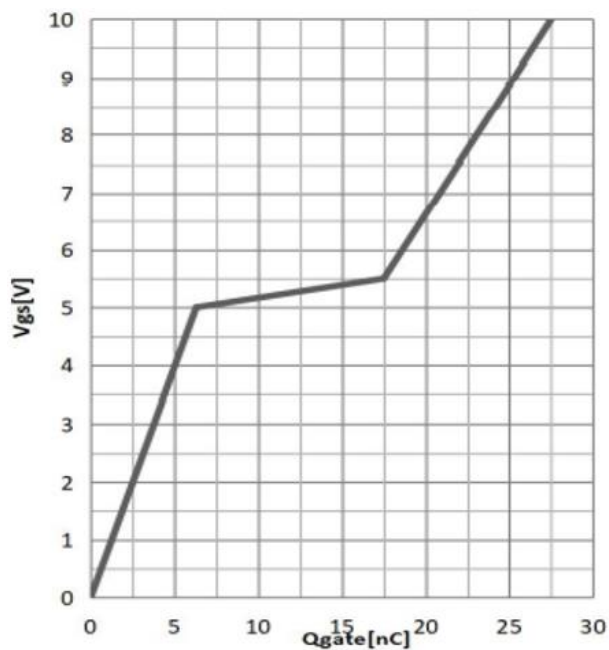


Fig.1 Gate Charge

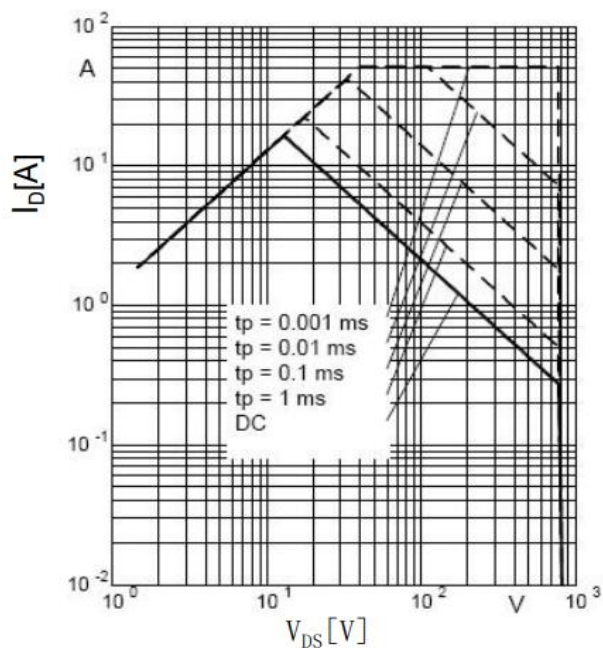


Fig.2 Safe Operation Area

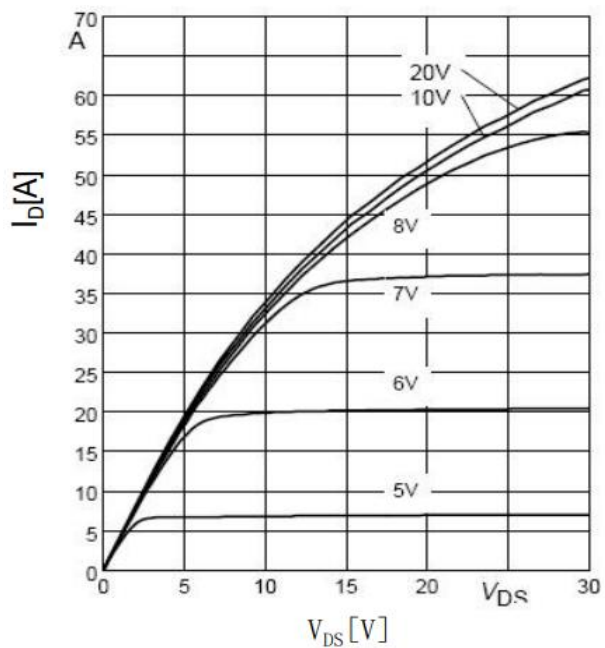


Fig.3 Output Characteristics

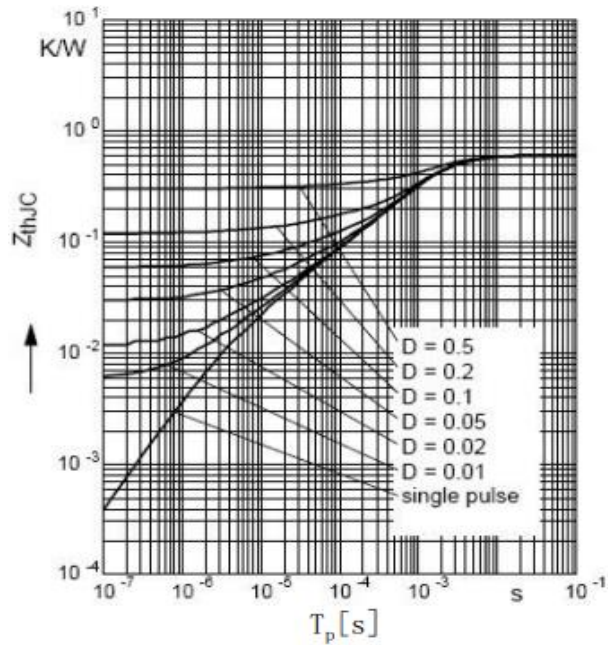


Fig.4 Transient Thermal Impedance

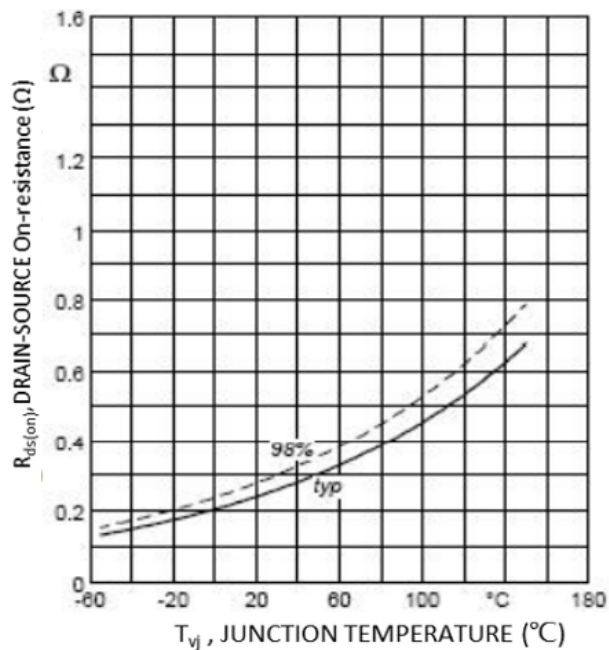


Fig.5 Drain-Source On Resistance

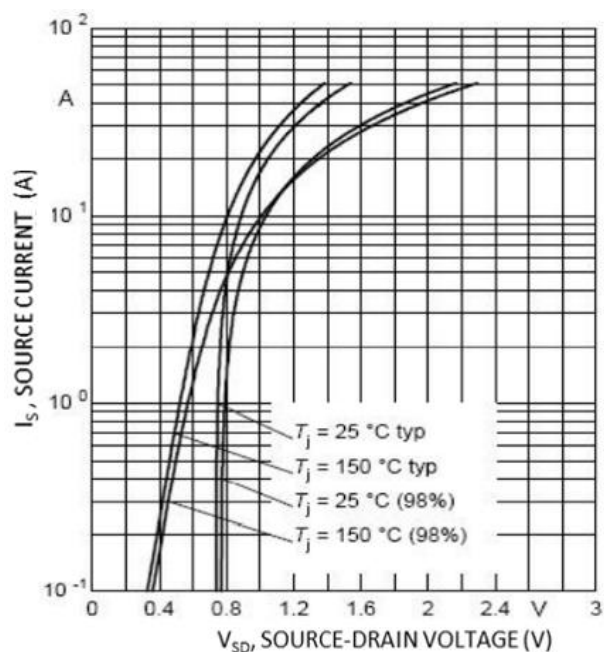


Fig.6 Source-Drain Diode Forward Current

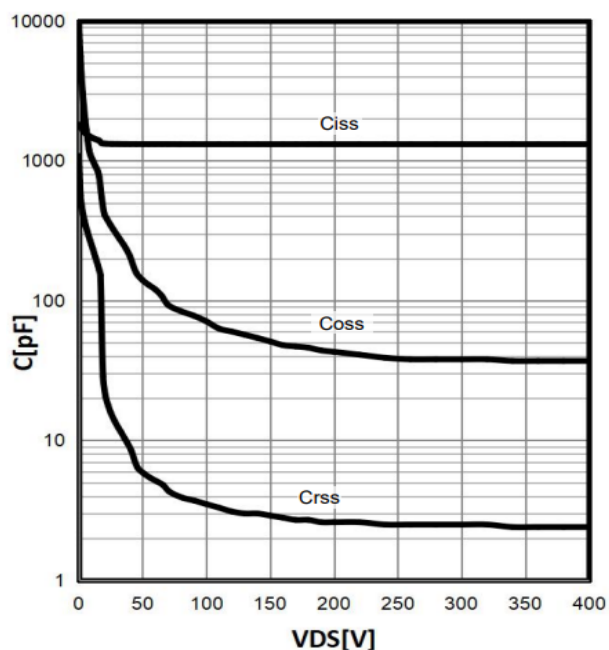
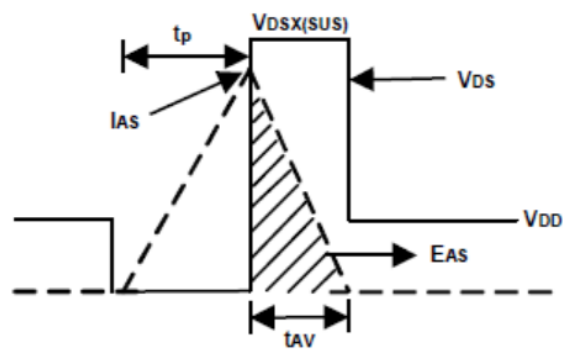
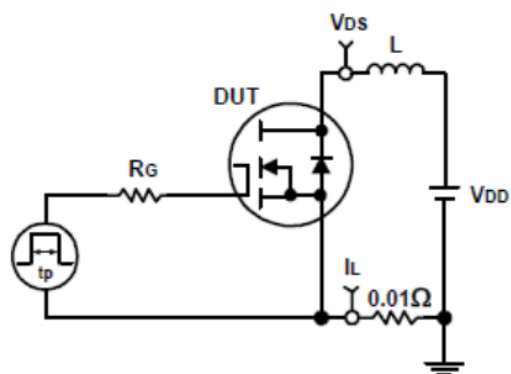
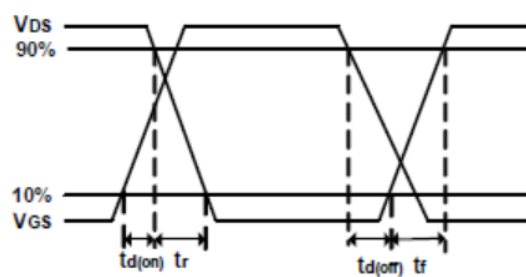
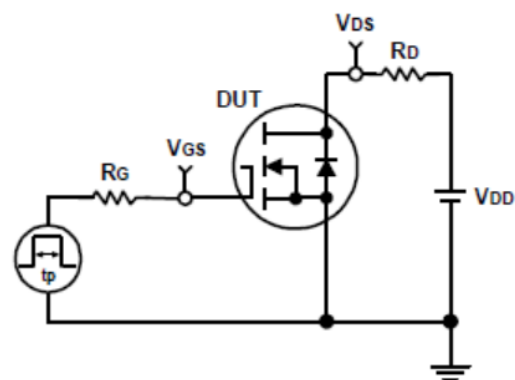


Fig.7 Capacitance

Avalanche Test Circuit and Waveforms

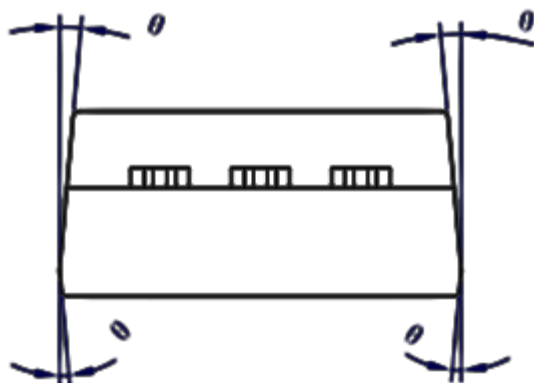
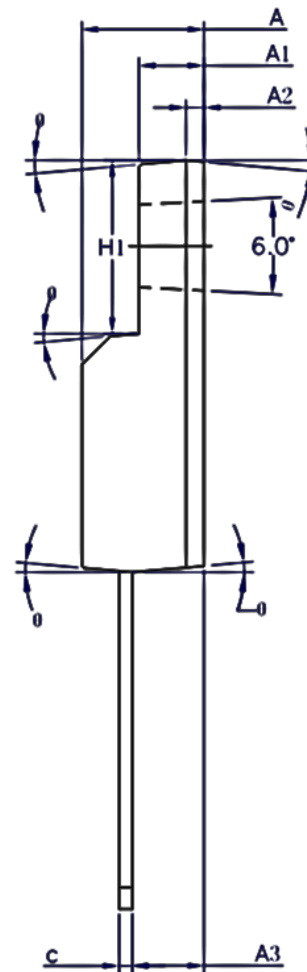
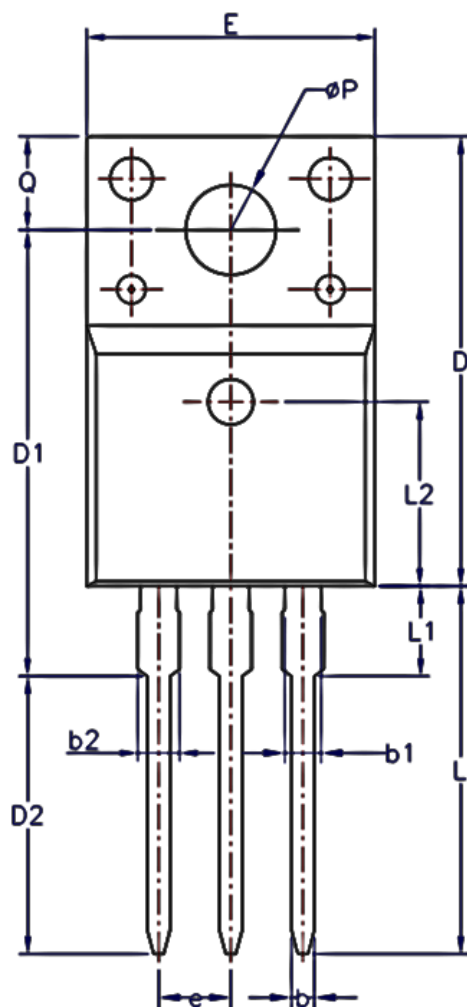


Switching Time Test Circuit and Waveforms



Package Information

TO-220-3L



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		
ØP	3.08	3.18	3.28
Q	3.20	—	3.40
Ø1	1°	3°	5°