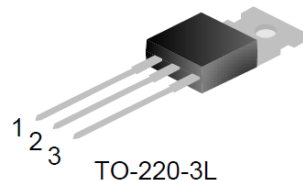


180A,100V N-CHANNEL POWER MOSFET

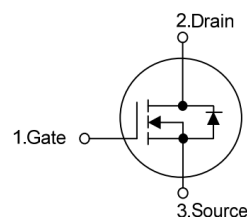
Features

- $R_{DS(on)}=3.45m\Omega$ (Typ.) @ $V_{GS}=10V, I_D=50A$
- New technology for high voltage device
- Low on-resistance
- Improved dv/dt capability
- Fast switching



Applications

- Motor Drives
- DC-DC Converter
- Uninterruptible Power Supply (UPS)



Key Performance and Package Parameters

Order codes	V_{DS}	I_D	$R_{DS(ON)}$, Typ	T_{vjmax}	Marking	Package
XM3R4S100A1L3-A	100V	180A	3.45m Ω	150 $^{\circ}C$	M3R4S100A1A	TO220-3

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

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	100	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current (T _c =25 $^{\circ}C$)	180	A
I_{DM}	Pulsed Drain Current	720	A
P_D	Maximum Power Dissipation (T _c =25 $^{\circ}C$)	278	W
E_{AS}	Avalanche Energy, Single Pulse (note1)	702	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)	TO220-3L	0.45	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	TO220-3L	50	$^{\circ}C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	100	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=100V, V_{GS}=0V$	---	---	1	μA
I_{GSS}	Gate Leakage Current, Forward	$V_{GS}=20V, V_{DS}=0V$	---	---	100	nA
	Gate Leakage Current, Reverse	$V_{GS}=-20V, V_{DS}=0V$	---	---	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2.2	---	3.8	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=50A$	--	3.45	4.2	$m\Omega$
Q_g	Total Gate Charge	$V_{DD}=80V$	---	115	---	nC
Q_{gs}	Gate-Source Charge	$V_{GS}=10V$	---	28	---	nC
Q_{gd}	Gate-Drain Charge	$I_D=50A$	---	33	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=50V, V_{GS}=10V$ $I_D=50A$	---	75	---	ns
t_r	Turn-on Rise Time		--	176	--	ns
$t_{d(off)}$	Turn-off Delay Time		---	110	---	ns
t_f	Turn-off Fall Time		---	66.7	---	ns
C_{iss}	Input Capacitance	$V_{DS}=50V$	---	7116	---	pF
C_{oss}	Output Capacitance	$V_{GS}=0V$	---	1067	---	pF
C_{rss}	Reverse Transfer Capacitance	$f=250\text{KHz}$	---	24	---	pF

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	$I_S=50A, V_{GS}=0V$	---	---	1.1	V
t_{rr}	Diode Reverse Recovery Time	$I_S=50A,$ $di_f/dt=100A/s$	---	51	---	ns
Q_{rr}	Diode Reverse Recovery Charge		---	56.8	---	nC

Notes:

1. $V_{DD}=90V, L=0.5\text{Mh}, I_{AS}=53A,$ starting, $T_J=25^\circ\text{C}.$

Typical Characteristics

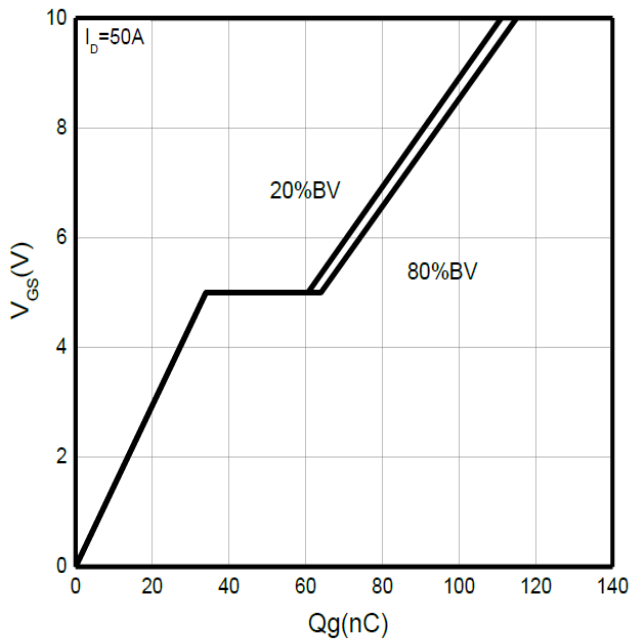


Fig.1 Gate Charge

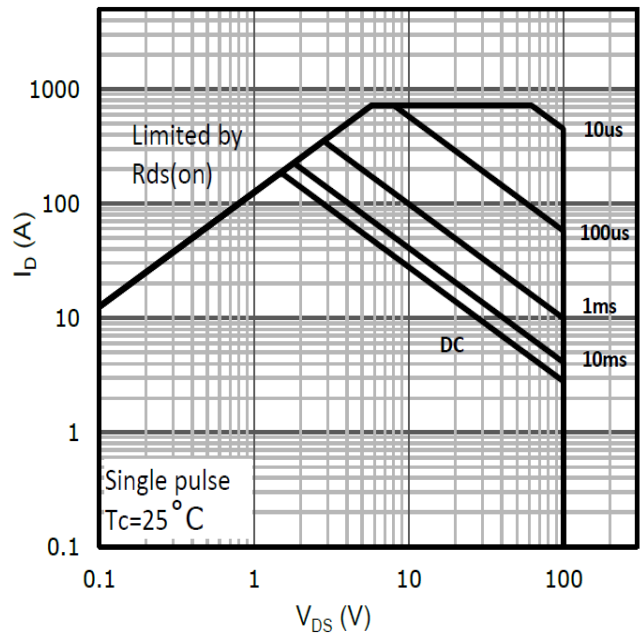


Fig.2 Safe Operation Area

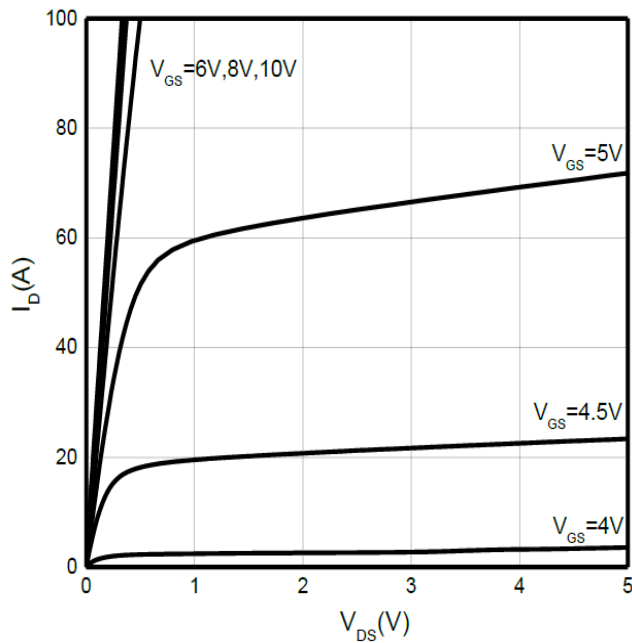


Fig.3 Output Characteristics

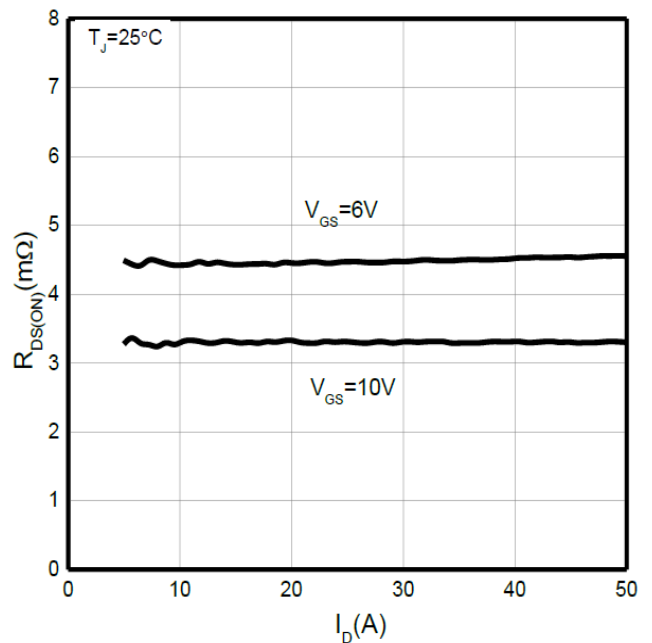


Fig.4 Drain-Source On Resistance

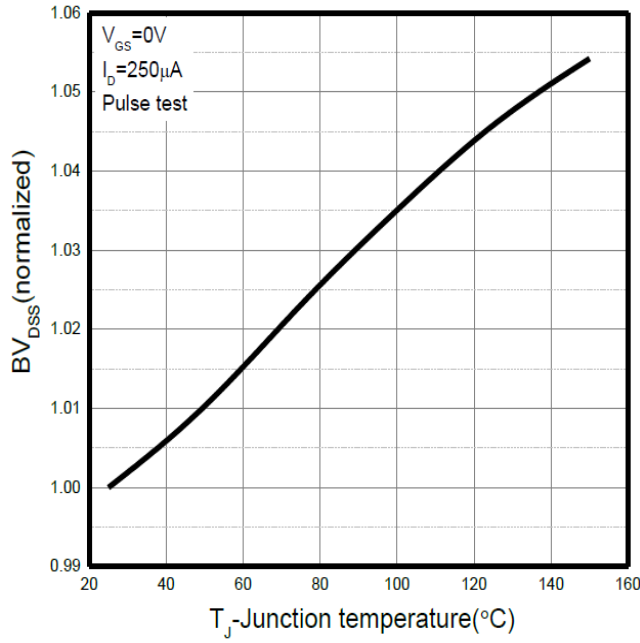


Fig.5 Drain-Source Breakdown Voltage

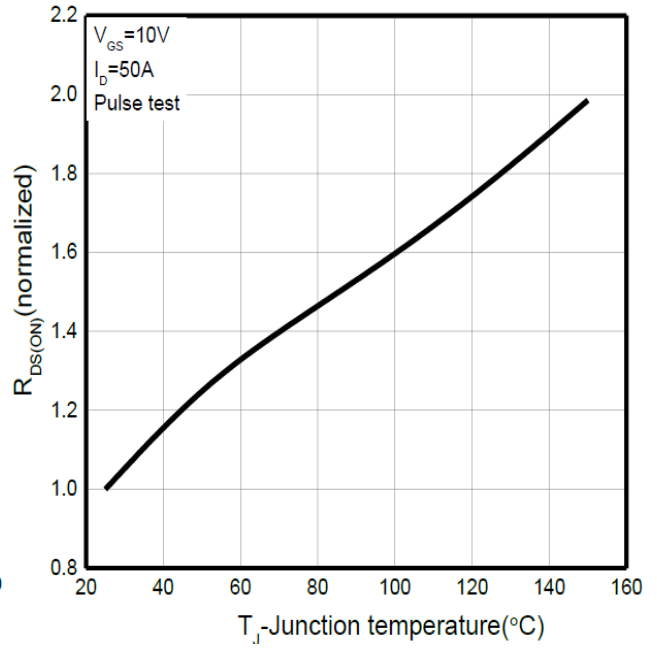


Fig.6 Drain-Source On Resistance

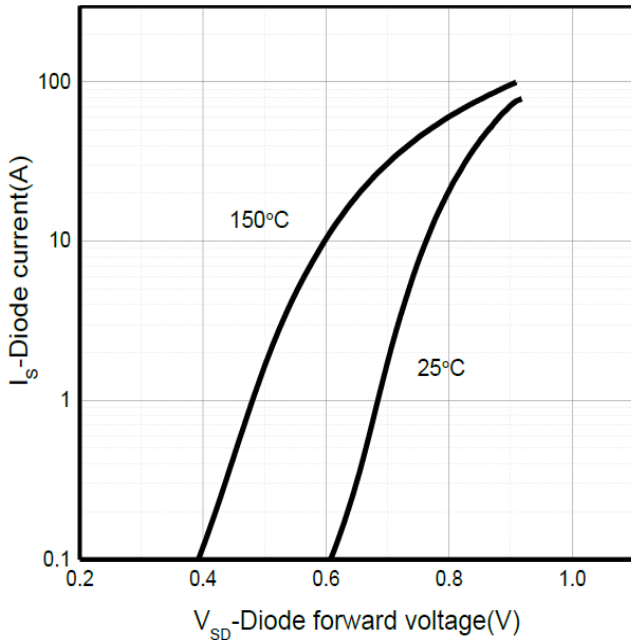


Fig.7 Source-Drain Diode Forward Current

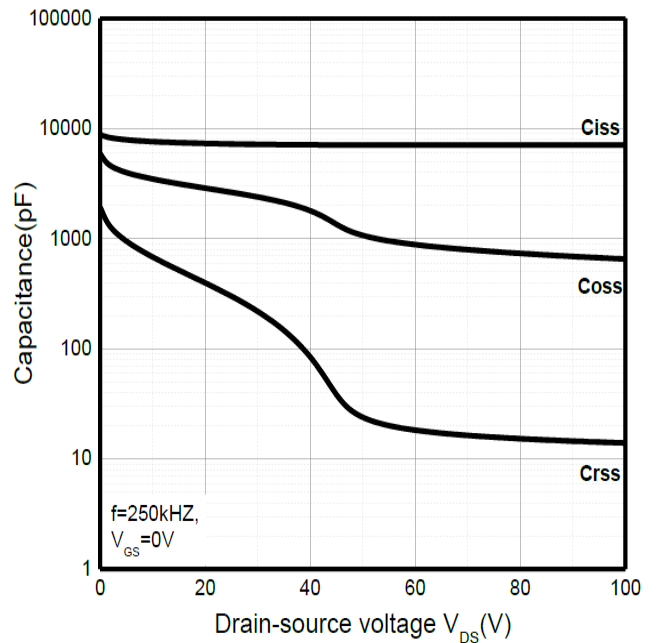
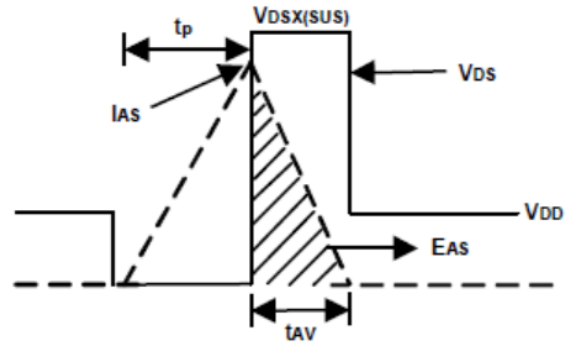
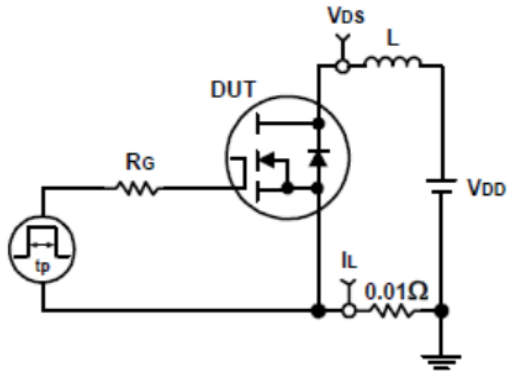
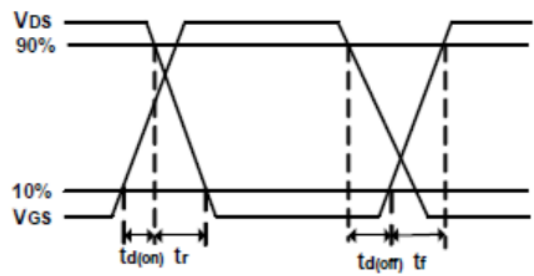
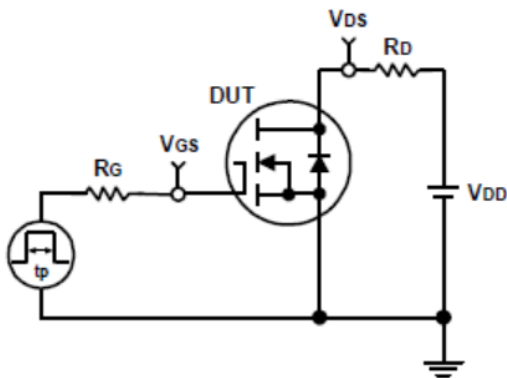


Fig.8 Capacitance

Avalanche Test Circuit and Waveforms

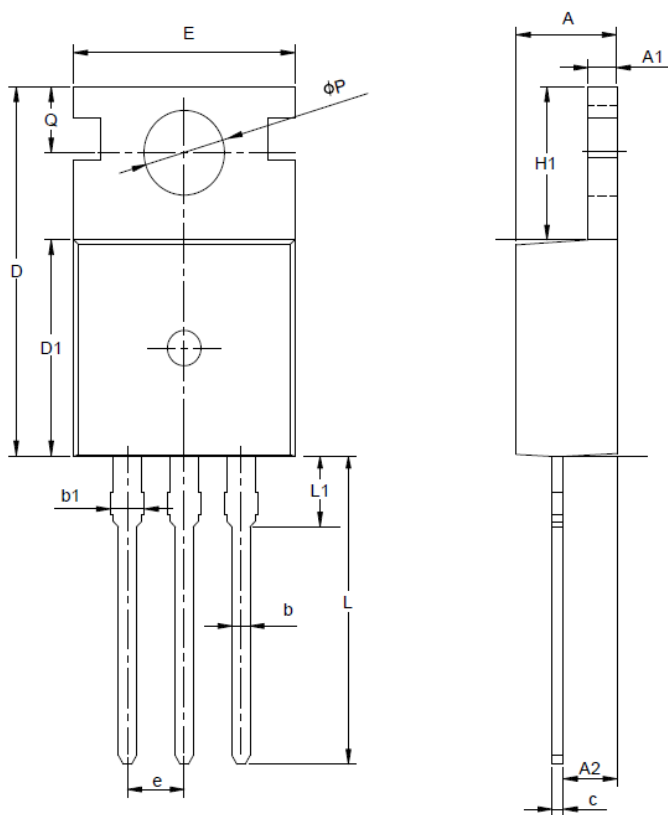


Switching Time Test Circuit and Waveforms



Package Information

TO-220-3L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	1.00	1.30	1.50
A2	1.80	2.40	2.80
b	0.60	0.80	1.00
b1	1.00	—	1.60
c	0.30	—	0.70
D	15.10	15.70	16.10
D1	8.10	9.20	10.00
E	9.60	9.90	10.40
e	2.54BSC		
H1	6.10	6.50	7.00
L	12.60	13.08	13.60
L1	—	—	3.95
ϕP	3.40	3.70	3.90
Q	2.60	—	3.20