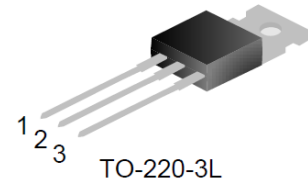


# 101A,100V N-CHANNEL POWER MOSFET

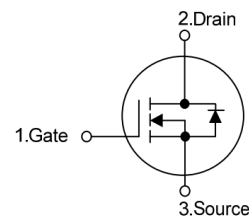
## Features

- $R_{DS(on)}=7.1m\Omega$  (Typ.) @  $V_{GS}=10V, I_D=30A$
- 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
XM7R1S100A1L3-A	100V	101A	7.1m $\Omega$	150 $^{\circ}C$	M7R1S100A1A	TO220-3

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

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-Source Voltage	100	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current ( T <sub>c</sub> =25 $^{\circ}C$ )	101	A
$I_{DM}$	Pulsed Drain Current	404	A
$P_D$	Maximum Power Dissipation ( T <sub>c</sub> =25 $^{\circ}C$ )	147	W
$E_{AS}$	Avalanche Energy, Single Pulse (note1)	132	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	0.85	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	TO220-3L	62	$^{\circ}C/W$

**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	$\mu A$
$I_{GSS}$	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	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.3	---	2.5	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=30A$	--	7.1	8.0	$m\Omega$
$Q_g$	Total Gate Charge	$V_{DD}=50V$	---	28.3	---	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS}=10V$	---	10	---	nC
$Q_{gd}$	Gate-Drain Charge	$I_D=50A$	---	4.2	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=50V, V_{GS}=10V$ $I_D=30A$	---	16.6	---	ns
$t_r$	Turn-on Rise Time		--	20	--	ns
$t_{d(off)}$	Turn-off Delay Time		---	68	---	ns
$t_f$	Turn-off Fall Time		---	20.8	---	ns
$C_{iss}$	Input Capacitance	$V_{DS}=50V$	---	1895	---	pF
$C_{oss}$	Output Capacitance	$V_{GS}=0V$	---	572.5	---	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1\text{MHz}$	---	11.8	---	pF

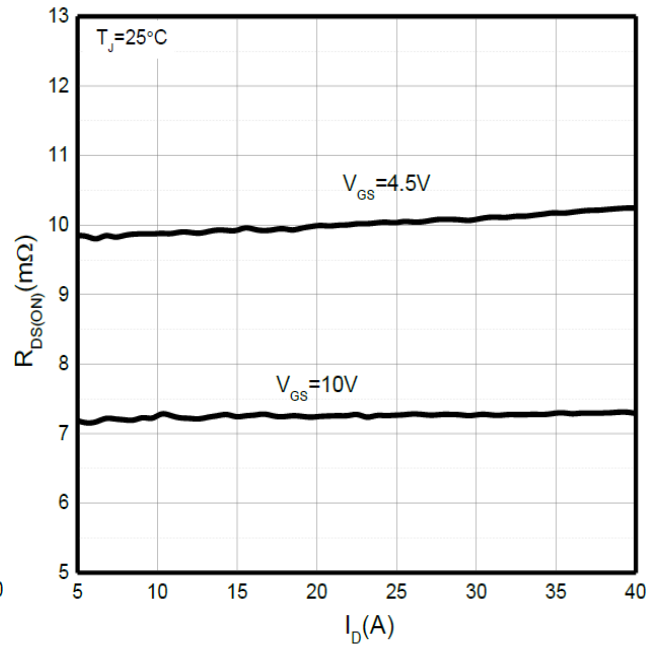
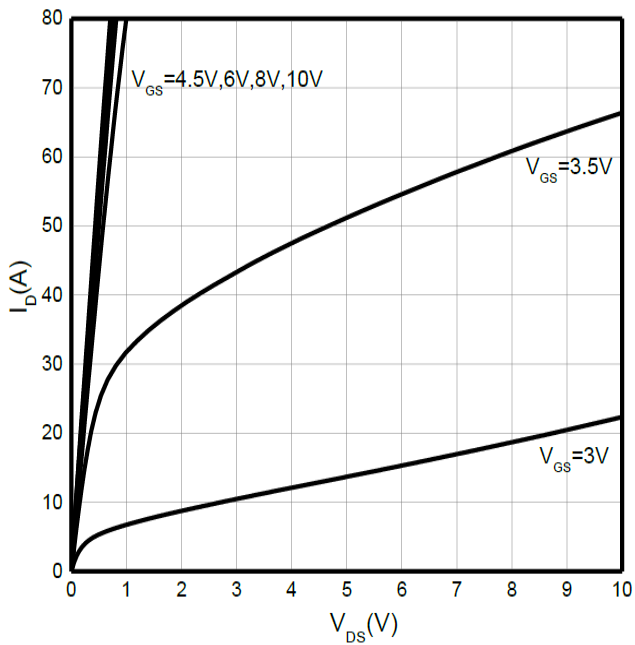
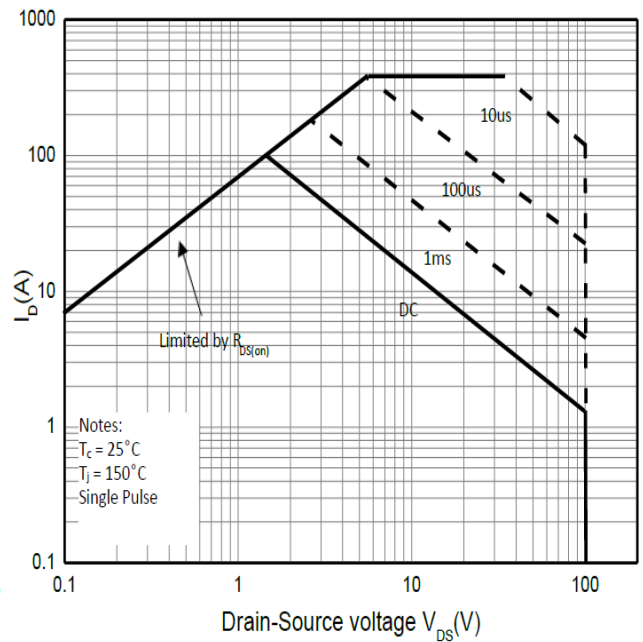
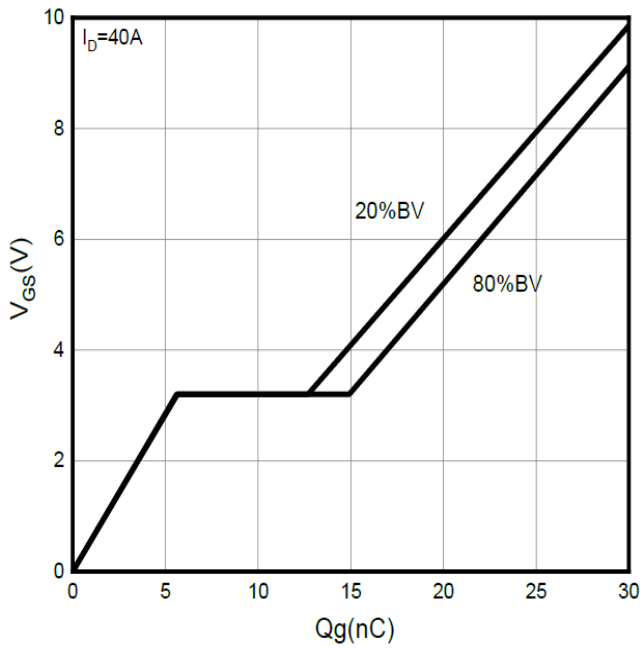
**Diode Characteristics** ( $T_c=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Diode Forward Voltage	$I_S=30A, V_{GS}=0V$	---	0.9	---	V
$t_{rr}$	Diode Reverse Recovery Time	$I_S=30A,$ $di_f/dt=100A/s$	---	50	---	ns
$Q_{rr}$	Diode Reverse Recovery Charge		---	72	---	nC

**Notes:**

1.  $V_{DD}=50V, L=0.5\text{mH}, I_{AS}=23A$ , starting,  $T_J=25^\circ\text{C}$ .

### Typical Characteristics



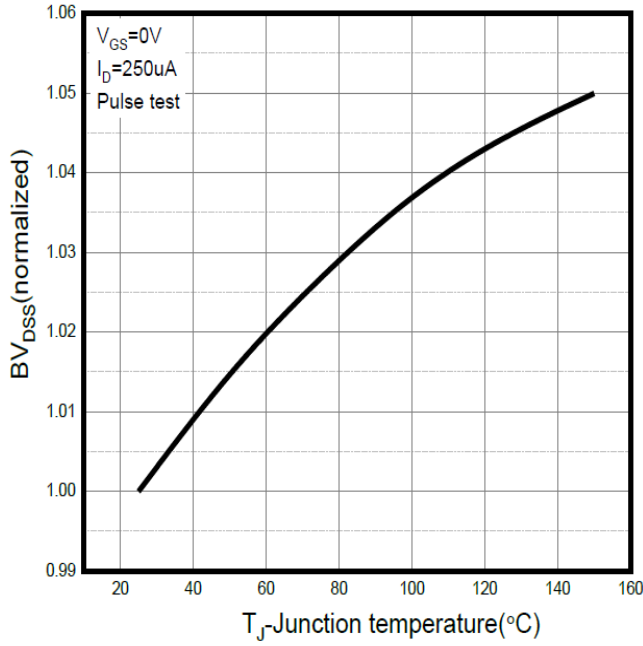


Fig.5 Drain-Source Breakdown Voltage

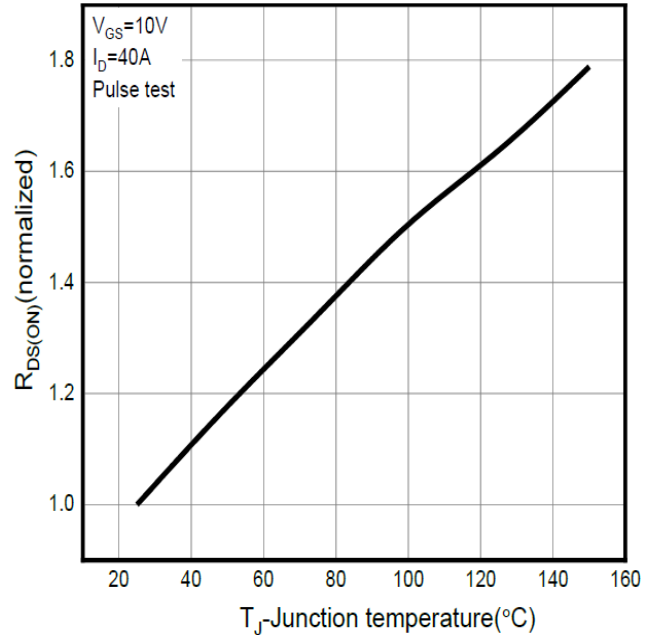


Fig.6 Drain-Source On Resistance

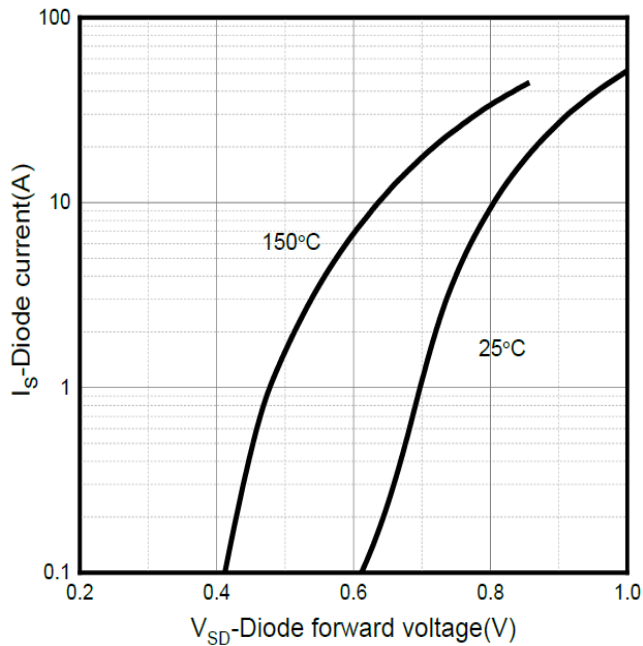


Fig.7 Source-Drain Diode Forward Current

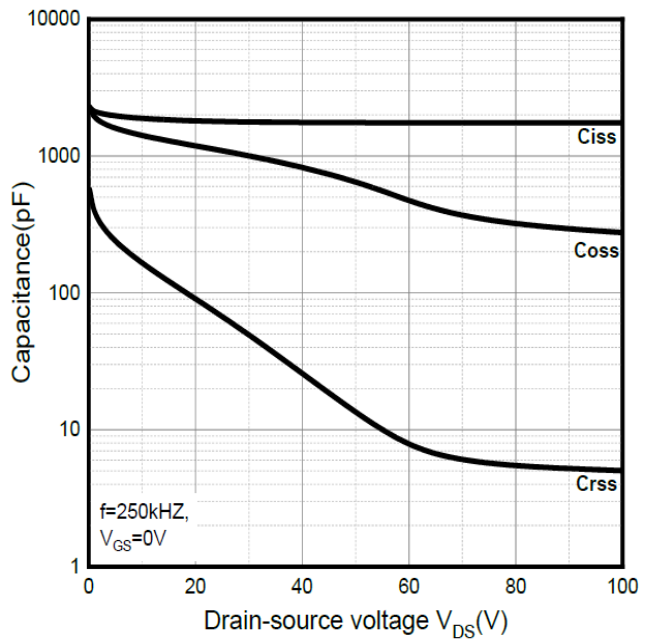
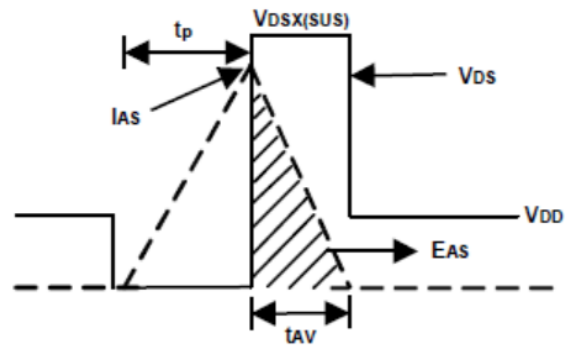
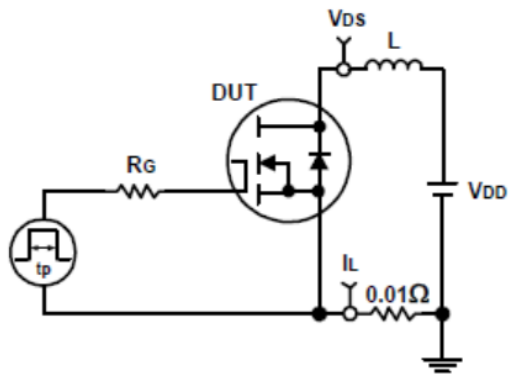
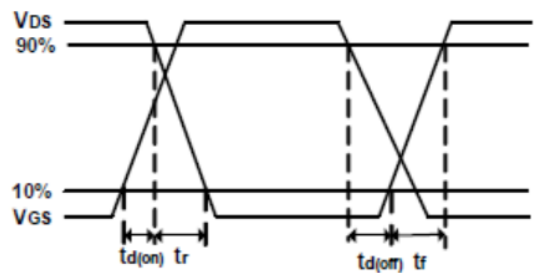
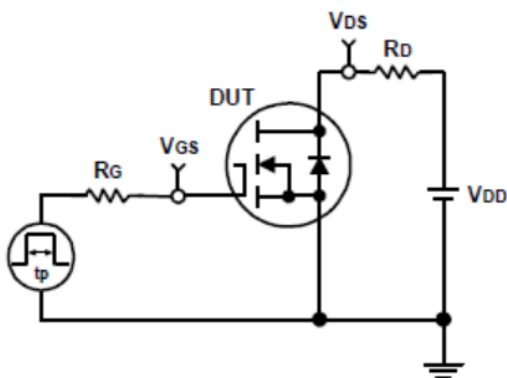


Fig.8 Capacitance

### Avalanche Test Circuit and Waveforms

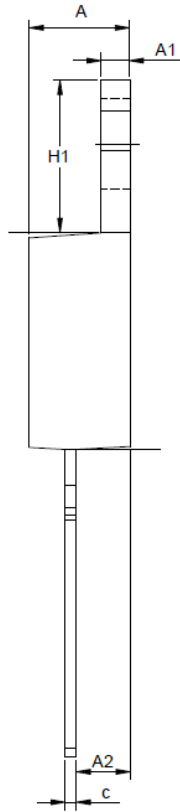
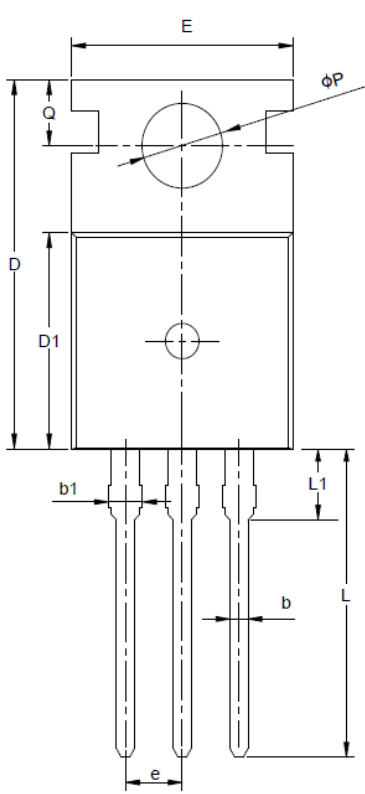


### Switching Time Test Circuit and Waveforms



**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
$\phi P$	3.40	3.70	3.90
Q	2.60	—	3.20