

**MOSFETs Silicon 120V N-Channel MOS**
**■ Applications**

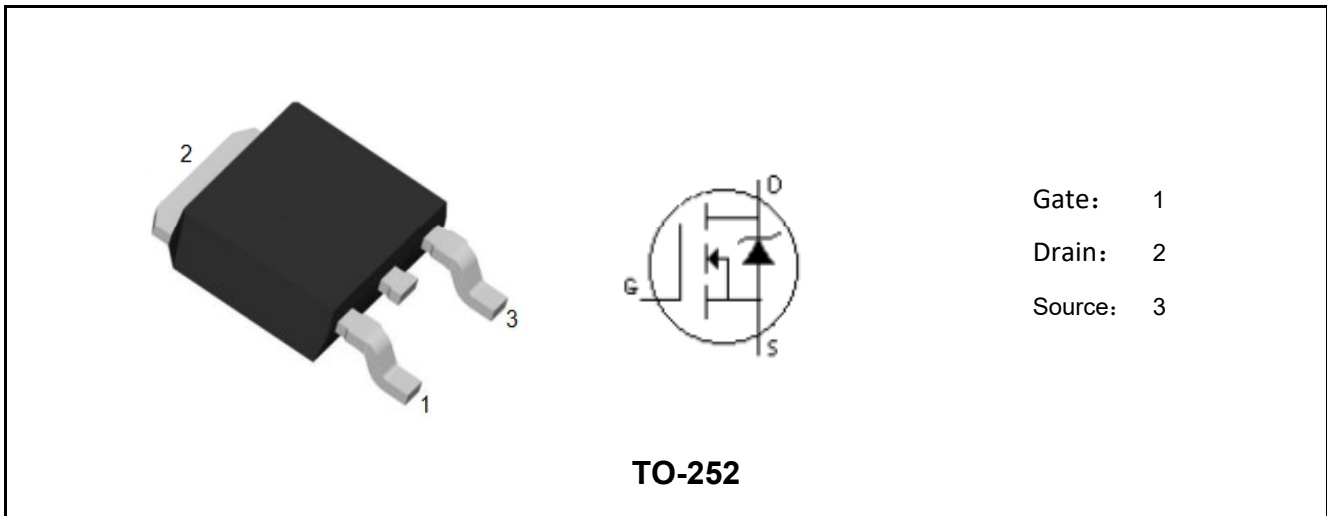
- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit
- DC/DC in Telecoms and Industrial

**■ Features**

- High Speed Power Switching, Logic Level
- Enhanced Body diode dv/dt capability
- Enhanced Avalanche Ruggedness
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested

**■ Product Summary**

$V_{DS}$	120	V
$I_D$	40	A
$R_{DS(ON),Typ}@10V}$	18	m $\Omega$
$R_{DS(ON),Typ}@4.5V}$	25	m $\Omega$
$Q_g$	13.5	nC



Marking	Package	Packaging	Min. package quantity
MK022R120SL	TO-252	Tape & Reel	3000



**■ Absolute Maximum Ratings (Tc=25°C unless otherwise noted)**

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	120	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current Tc=25°C (Note 1)	$I_D$	40	A
Continuous Drain Current Tc=100°C (Note 1)		30	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	100	A
Total Dissipation	$P_D$	100	W
Junction Temperature	$T_J$	175	°C
Storage Temperature	$T_{stg}$	-55-175	°C
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	90	mJ

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

**■ Thermal Characteristics**

Parameter	Symbol	Max	Unit
Maximum Junction-to-Case	$R_{\theta JC}$	1.5	°C/W
Maximum Junction-to-Ambient (Note 3)	$R_{\theta JA}$	60	°C/W

Note 1: Ensure that the channel temperature does not exceed 175°C.

Note 2:  $V_{DD}=50V$ ,  $T_{ch}=25^{\circ}C$ (initial),  $L=0.5mH$ ,  $R_g=25\Omega$ .

Note 3: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}C$ . The value in any given application depends on the user's specific board design.

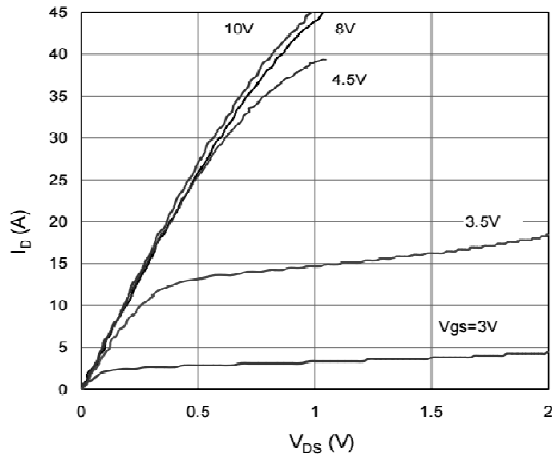
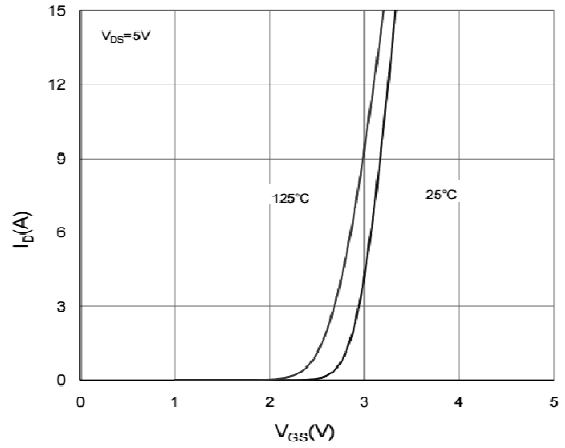
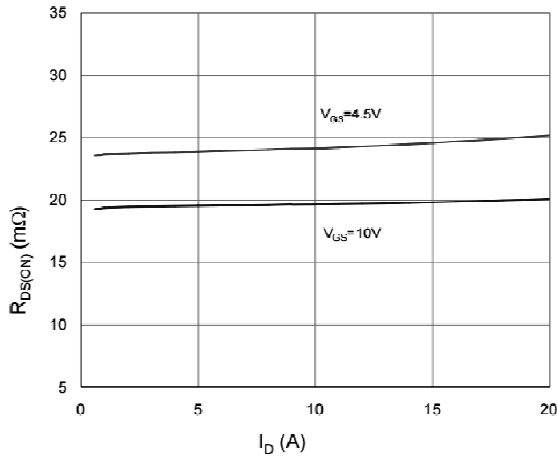
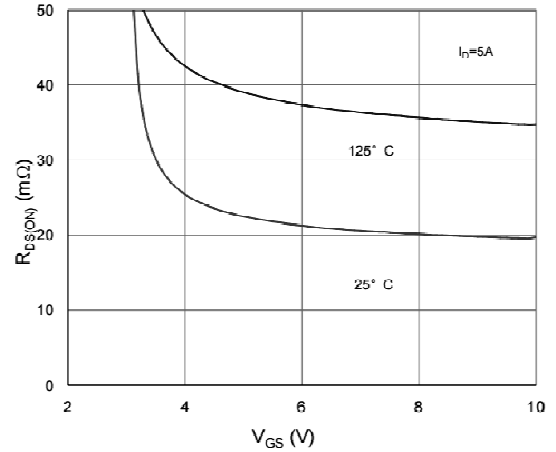
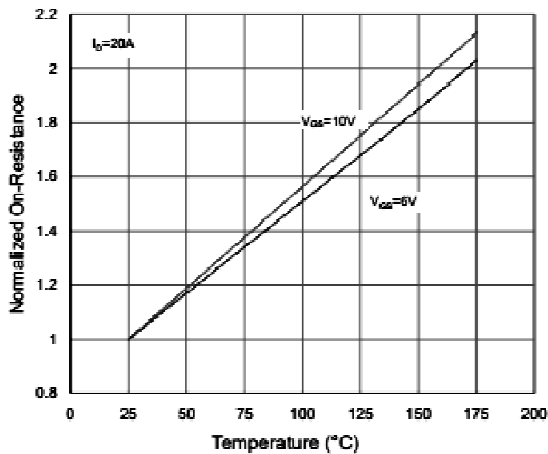
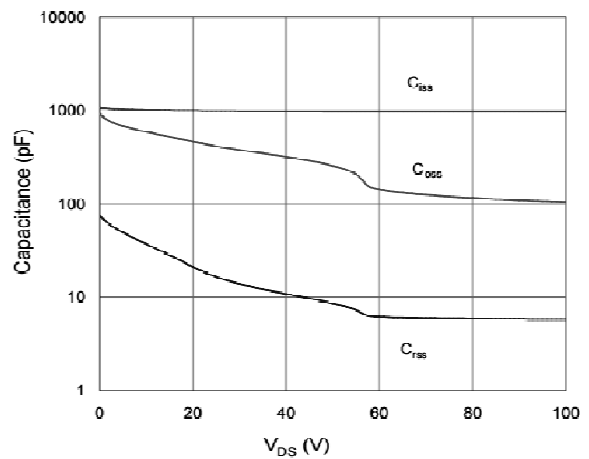
Note: This transistor is sensitive to electrostatic discharge and should be handled with care.

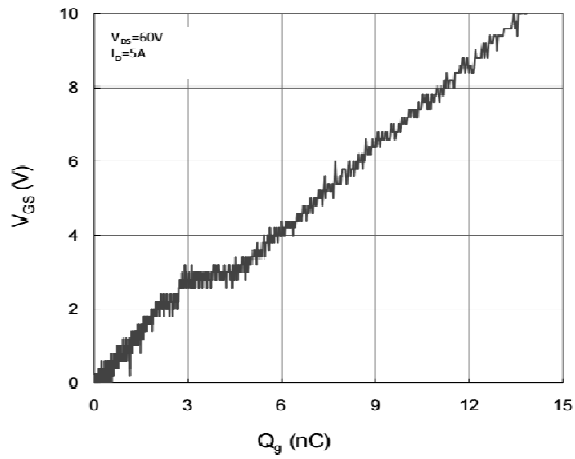


**■ Electrical Characteristics (Tc=25°C unless otherwise noted)**

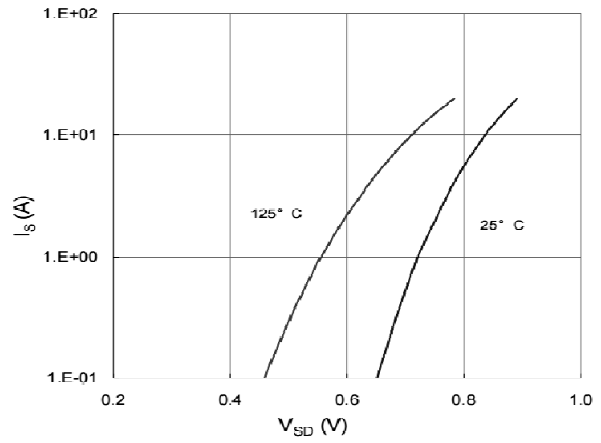
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	120	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=120V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.4	2	2.4	V
Drain-Source On Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=5A$	-	25	35	m $\Omega$
		$T_j=125^\circ C$	-	42	-	
		$V_{GS}=10V, I_D=10A$	-	18	22	
		$T_j=125^\circ C$	-	34	-	
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=35V, V_{GS}=0V,$ $f=1.0MHz$	-	1100	-	pF
Output Capacitance	$C_{oss}$		-	380	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	13	-	pF
Gate Resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V,$ $f=1.0MHz$	-	3	-	$\Omega$
<b>Switching Paramters</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=60V, I_D=5A,$ $V_{GS}=10V, R_G=10\Omega$	-	8	-	ns
Turn-On Rise Time	$t_r$		-	8	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	ns
Turn-Off Fall Time	$t_f$		-	10	-	ns
Total Gate Charge	$Q_g$	$V_{DS}=60V, I_D=5A,$ $V_{GS}=10V$	-	13.5	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.8	-	nC
Gate-Drain Charge	$Q_{gd}$		-	2	-	nC
<b>Source-Drain Characteristics</b>						
Diode Forward Voltage	$V_{sd}$	$V_{GS}=0V, I_S=10A$	-	0.85	1.2	V
Reverse Recovery Time	$t_{rr}$	$V_R=60V, I_F=5A,$ $di/dt=500A/\mu s$	-	25	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	90	-	nC



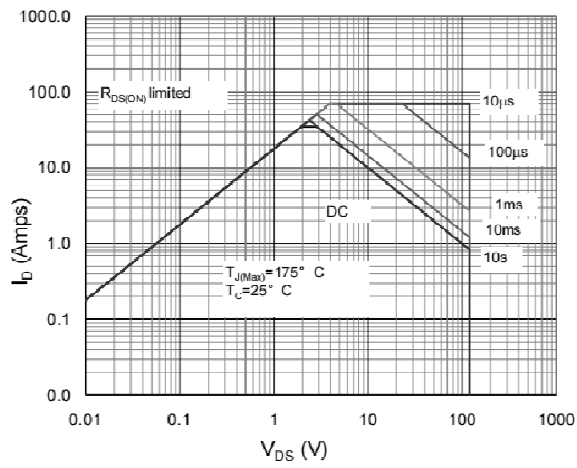
**Characteristics Curves**

**Output Characteristics**

**Transfer Characteristics**

**On Resistance Vs Drain Current**

**On Resistance Vs Gate Source Voltage**

**Rdson-Junction Temperature**

**Capacitance**

Gate Charge Waveform



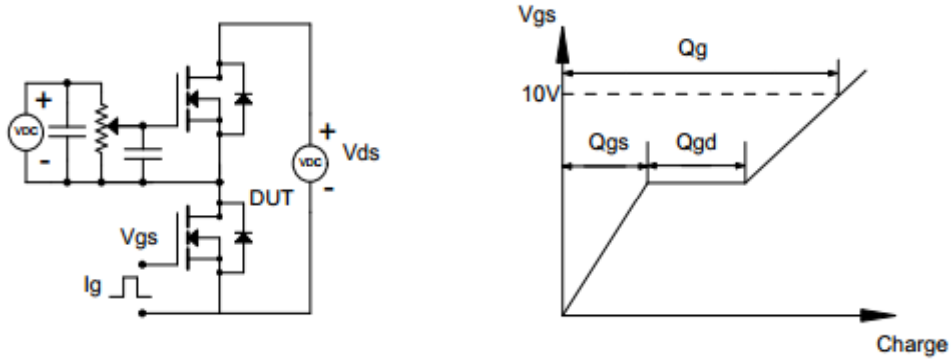
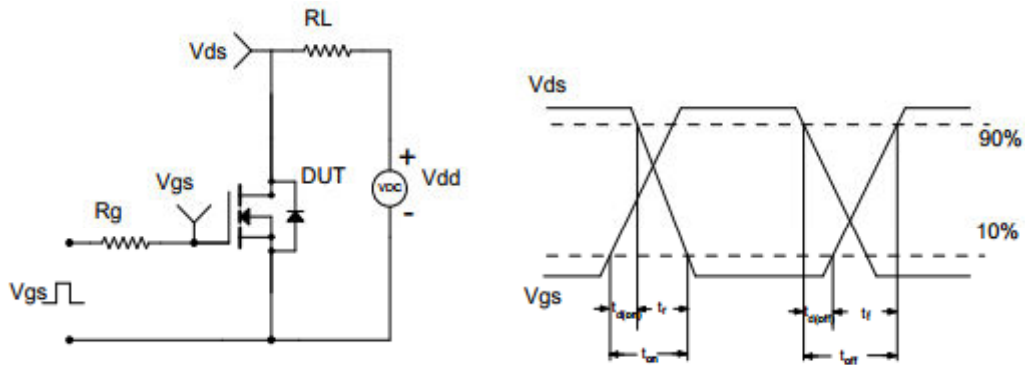
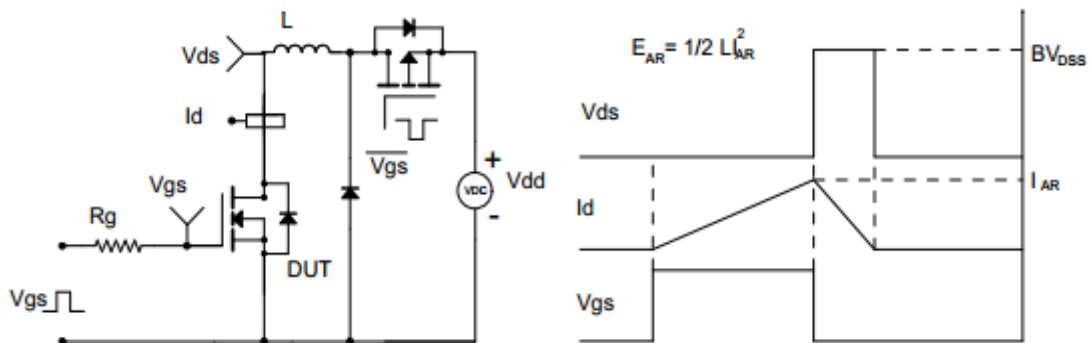
Source-Drain Diode Forward Voltage



Maximum Safe Operating Area

Note : The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



**■ Test Circuit & Waveform**
**Gate Charge Test Circuit & Waveform**

**Resistive Switching Test Circuit & Waveform**

**Unclamped Inductive Switching (UIS) Test Circuit & Waveform**




■ TO-252 Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	2.10		2.50	E	5.80		6.30
B	0.80		1.25	e1	2.25	2.30	2.35
b	0.50		0.85	e2	4.45		4.75
b1	0.50		0.90	L1	9.50		10.20
b2	0.45		0.60	L2	0.90		1.45
C	0.45		0.60	L3	0.60		1.10
D	6.35		6.75	K	-0.1		0.10
D1	5.10		5.50				

