

MOSFETs Silicon 40V N-Channel MOS
■ Applications

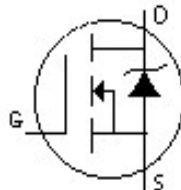
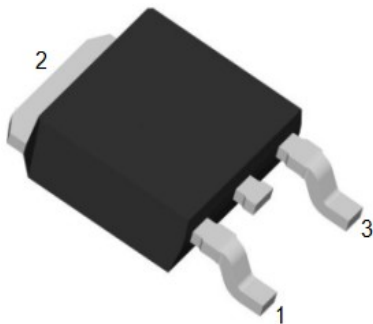
- Synchronus Rectification
- Industrial and Motor Drive
- DC/DC and AC/DC Converters
- Power Tools

■ Features

- High-Speed Switching
- Low $R_{DS(ON)}$
- Low Gate Charge
- Capable of 4.5 V Gate Drive
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested

■ Product Summary

V_{DS}	40	V
I_D	230	A
$R_{DS(ON)}, Typ @ 10V$	1.7	m Ω
$R_{DS(ON)}, Typ @ 4.5V$	2.1	m Ω
Q_g	85	nC



Gate: 1
Drain: 2
Source: 3

TO-252

Marking	Package	Packaging	Min. package quantity
MK002R040SL	TO-252	Tape & Reel	3000



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

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current Tc=25°C (Note 1)	I_D	230	A
Continuous Drain Current Tc=100°C (Note 1)		145	A
Drain Current-Pulsed (Note 1)	I_{DM}	600	A
Total Dissipation	P_D	165	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	-55-150	°C
Single Pulse Avalanche Energy (Note 2)	E_{AS}	1010	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	$R_{\theta JC}$	0.76	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	60	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C.

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

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

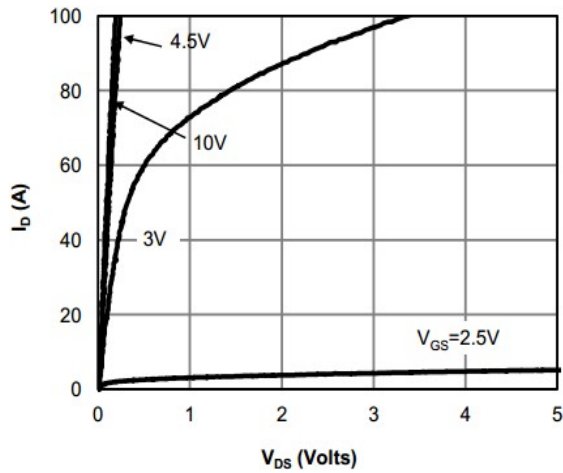


■ Electrical Characteristics (Tc=25°C unless otherwise noted)

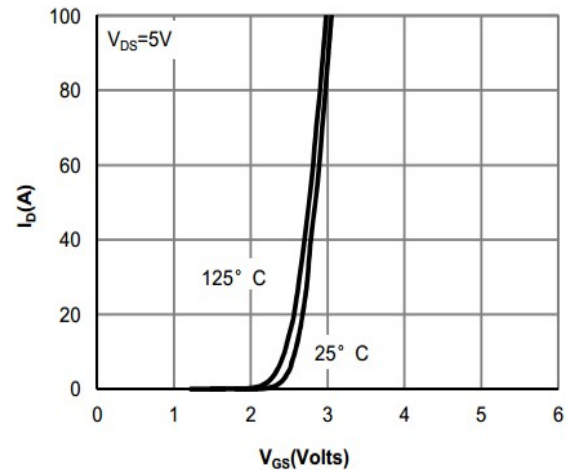
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	40	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	-	-	1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.3	1.7	2.4	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =15A	-	2.1	2.5	mΩ
		Tj=125℃	-	2.9	-	
		V _{GS} =10V, I _D =20A	-	1.7	2	
		Tj=125℃	-	2.4	-	
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1.0MHz	-	5055	-	pF
Output Capacitance	C _{oss}		-	1945	-	pF
Reverse Transfer Capacitance	C _{rss}		-	185	-	pF
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1.0MHz	-	3.8	-	Ω
Switching Paramters						
Turn-On Delay Time	t _{d(on)}	V _{DS} =20V, I _D =20A, V _{GS} =10V, R _L =2Ω	-	20	-	ns
Turn-On Rise Time	t _r		-	8	-	ns
Turn-Off Delay Time	t _{d(off)}		-	80	-	ns
Turn-Off Fall Time	t _f		-	30	-	ns
Total Gate Charge	Q _g	V _{DS} =20V, I _D =20A, V _{GS} =10V	-	85	-	nC
Gate-Source Charge	Q _{gs}		-	14	-	nC
Gate-Drain Charge	Q _{gd}		-	16	-	nC
Source-Drain Characteristics						
Diode Forward Voltage	V _{sd}	V _{GS} =0V, I _S =10A	-	0.7	1.2	V
Reverse Recovery Time	t _{rr}	V _R =50V, I _F =10A, di/dt=100A/us	-	194	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.39	-	nC



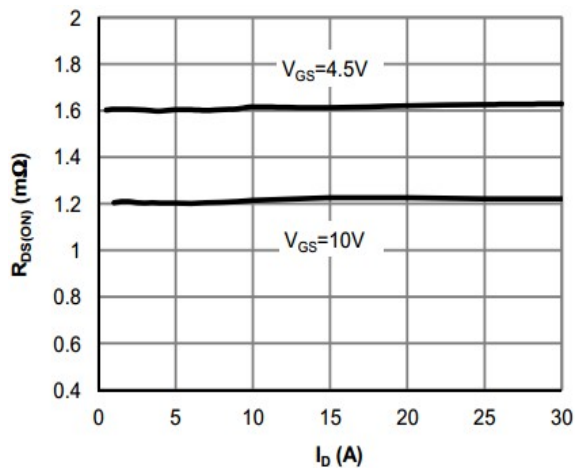
■ Characteristics Curves



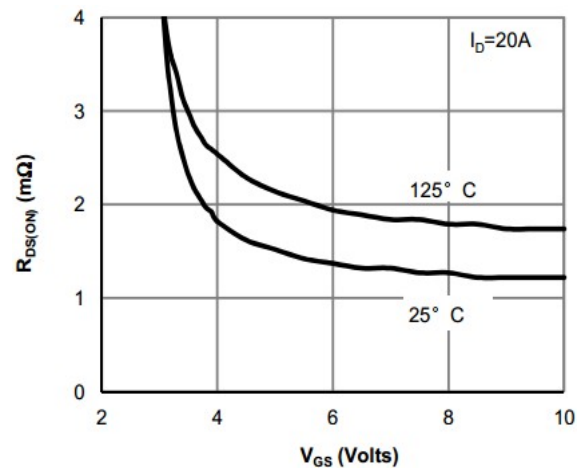
Output Characteristics



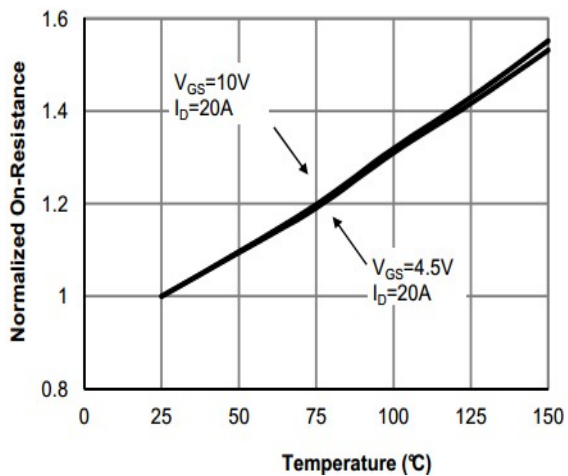
Transfer Characteristics



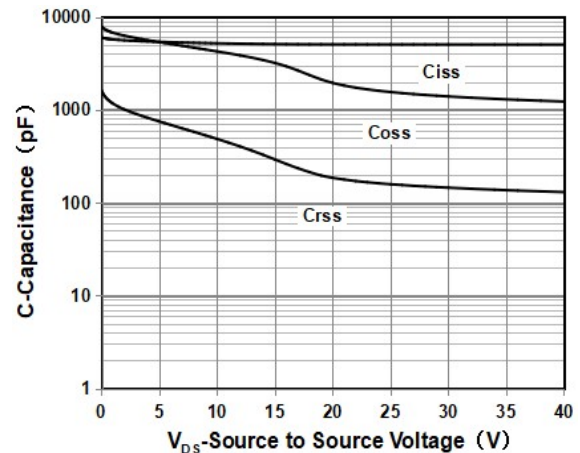
On Resistance Vs Drain Current



On Resistance Vs Gate Source Voltage

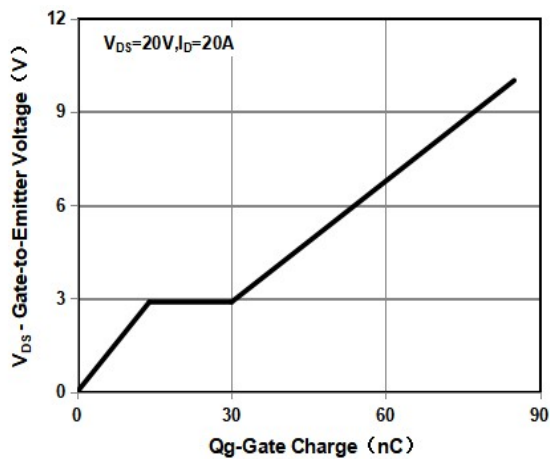


Rdson-JunctionTemperature

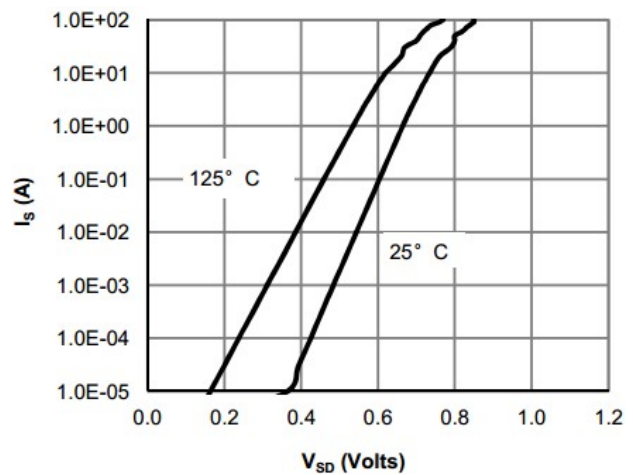


Capacitance

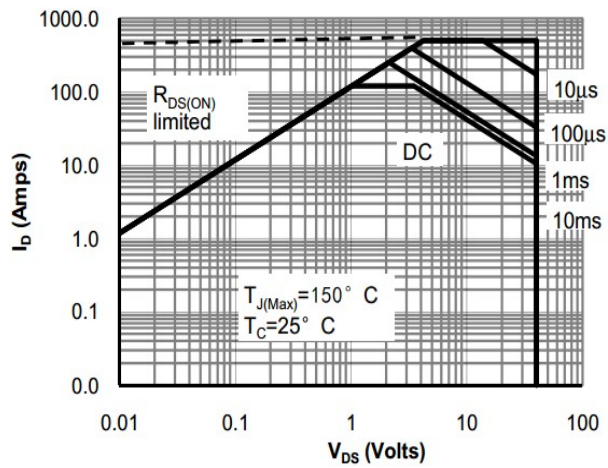




Gate Charge Waveform



Source-Drain Diode Forward Voltage



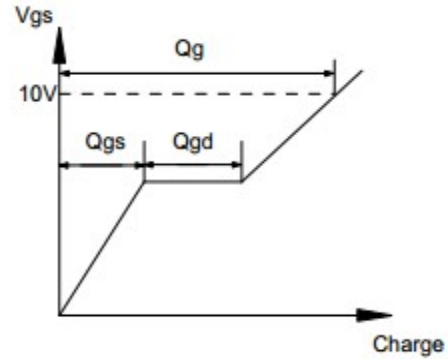
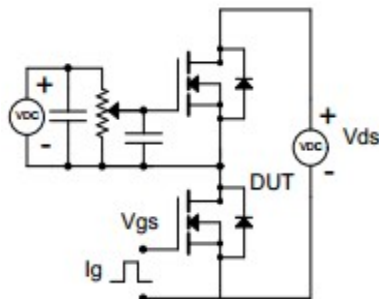
Maximum Safe Operating Area

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

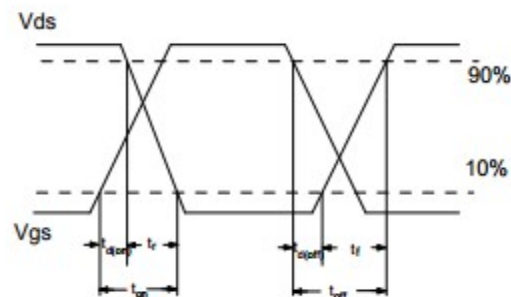
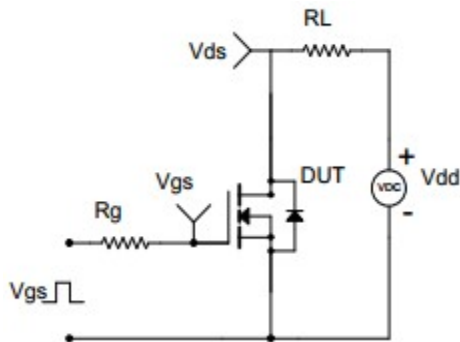


■ Test Circuit & Waveform

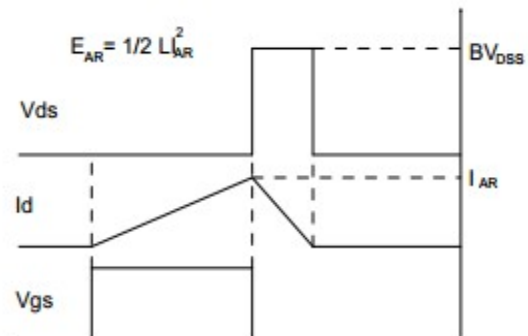
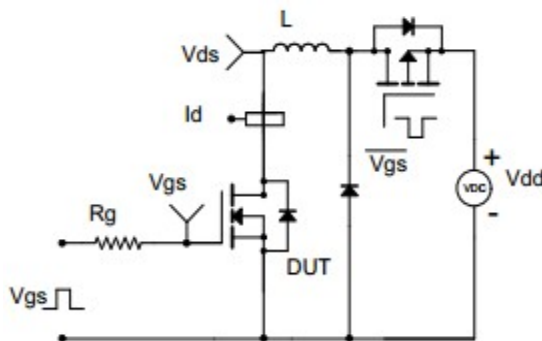
Gate Charge Test Circuit & Waveform



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				

