MK190R50CFD2

MOSFETs Silicon 500V N-Channel MOS

Applications

- PC power
- LED lighting
- Solar/UPS
- EV Charger

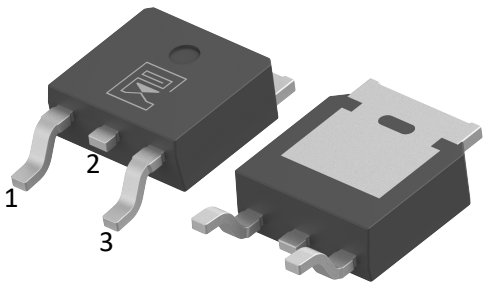
Product Summary

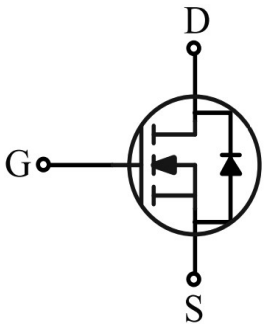
V_{DS} @ Tj,max	550	V
I_D	20	A
$R_{DS(ON)}$,Typ@10V	0.18	Ω
Q_g	23	nC

Features

- Multi-Epi process SJ-FET
- Low $R_{DS(ON)}$
- Excellent stability and uniformity
- 100% UIS and RG Tested
- Fast-Recovery body diode

TO-252





Gate： 1

Drain： 2

Source： 3

Package Marking and Ordering Information

Ordering code	Marking	Package	Packaging	Min. package quantity
MK190R50CFD2	MK190R50CFD2	TO-252	Tape & Reel	3000

Absolute Maximum Ratings（Tc=25℃ unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	500	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current Tc=25℃	(Note 1)	I_D	20	A
Continuous Drain Current Tc=100℃	(Note 1)		13	
Drain Current-Pulsed	(Note 1)	I_{DM}	65	A
Total Dissipation		P_D	104	W
Junction Temperature		T_j	150	℃
Storage Temperature		T_{stg}	-55-150	℃
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	56	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	$R_{\theta JC}$	1.2	℃/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	60	℃/W

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

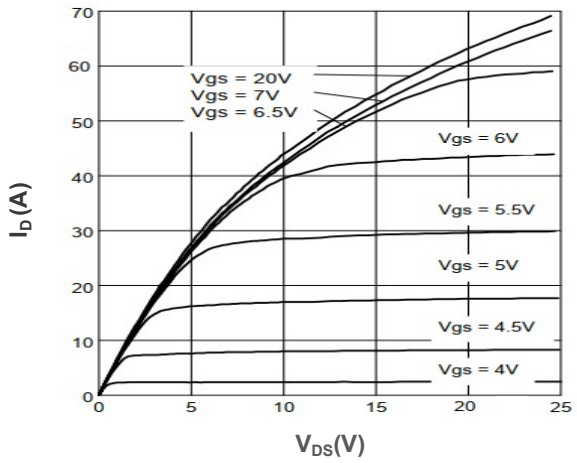
Note 2：V_{DD}=100V, T_{ch}= 25℃(initial), L=0.5mH, R_g=25Ω.

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

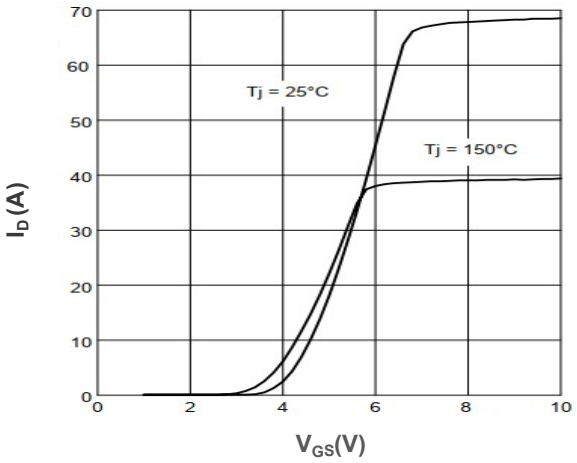
Electrical Characteristics（Tc=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250uA	500	-	-	V
		Tj=150°C	550	-	-	
Drain-Source Leakage Current	I_{DSS}	V_{DS}=500V,V_{GS}=0V	-	-	5	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±30V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS},I_D=250uA	2.1	3.1	4.1	V
Drain-Source On Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=10A	-	0.18	0.19	Ω
		Tj=150°C	-	0.43	-	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHz	-	1050	-	pF
Output Capacitance	C_{oss}		-	1160	-	pF
Reverse Transfer Capacitance	C_{rss}		-	20	-	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V, f=1.0MHz	-	2.5	-	Ω
Switching Paramters						
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=400V,I_D=10A, V_{GS}=10V,R_G=2Ω	-	20	-	ns
Turn-On Rise Time	t_r		-	5	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	ns
Turn-Off Fall Time	t_f		-	5	-	ns
Total Gate Charge	Q_g	V_{DS}=400V,I_D=10A, V_{GS}=10V	-	23	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	7	-	nC
Source-Drain Characteristics						
Max. Diode Forward Cuurent	I_S		-	-	20	A
Max. Pulsed Forward Cuurent	I_{SM}		-	-	65	A
Diode Forward Voltage	V_{sd}	V_{GS}=0V,I_S=10A	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_R=300V,I_F=10A, di/dt=100A/us	-	115	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.6	-	μC

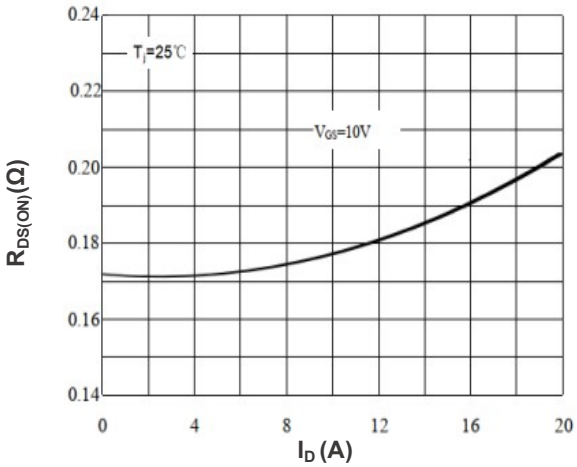
Characteristics Curves



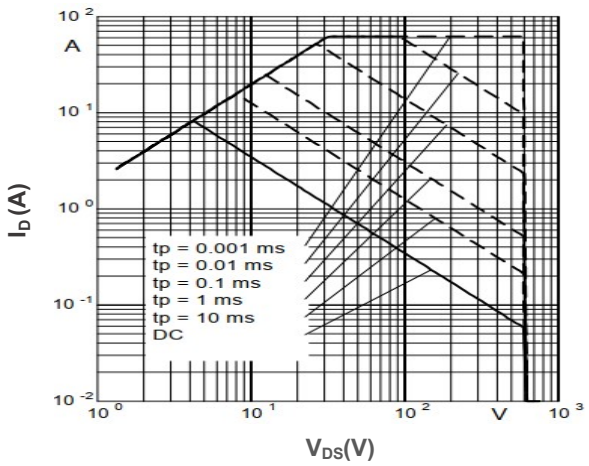
Output Characteritsics



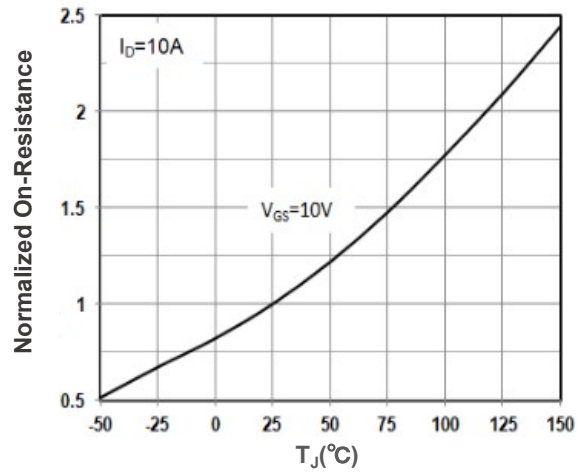
Transfer Characteritsics



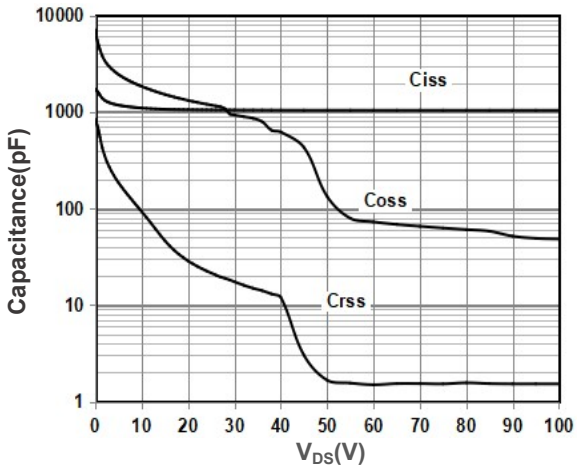
On Resistance Vs Drain Current



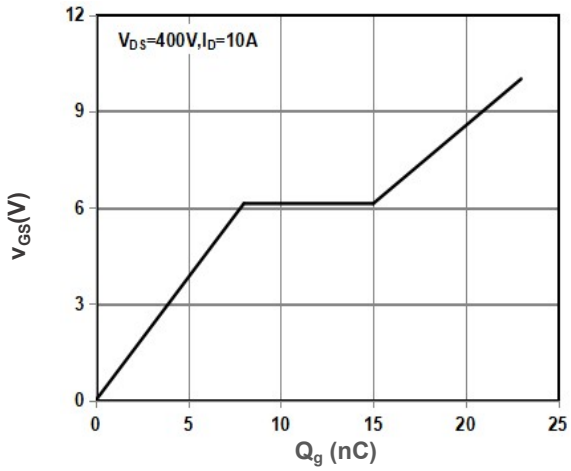
Maximum Safe Operating Area



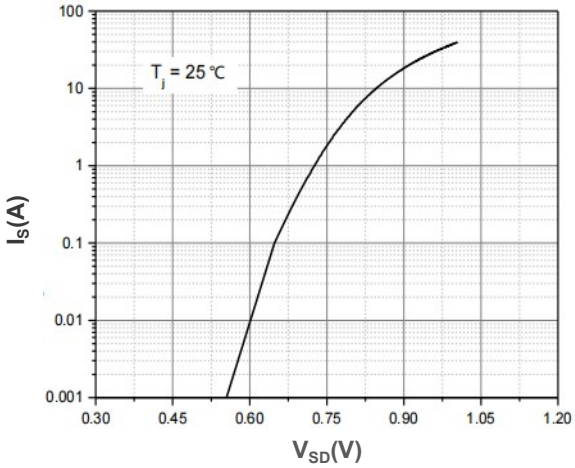
Rdson-JunctionTemperature



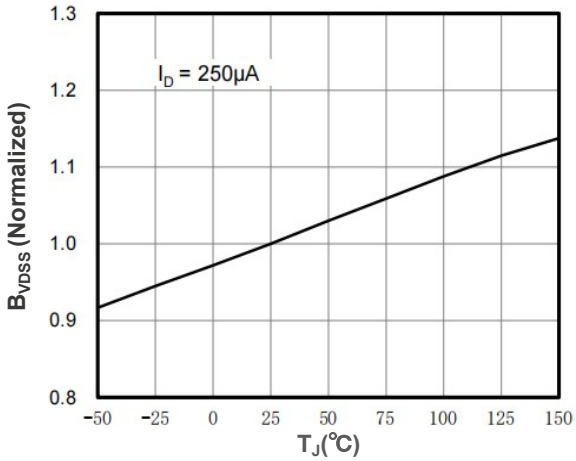
Capacitance



Gate Charge Waveform



Source-Drain Diode Forward Voltage

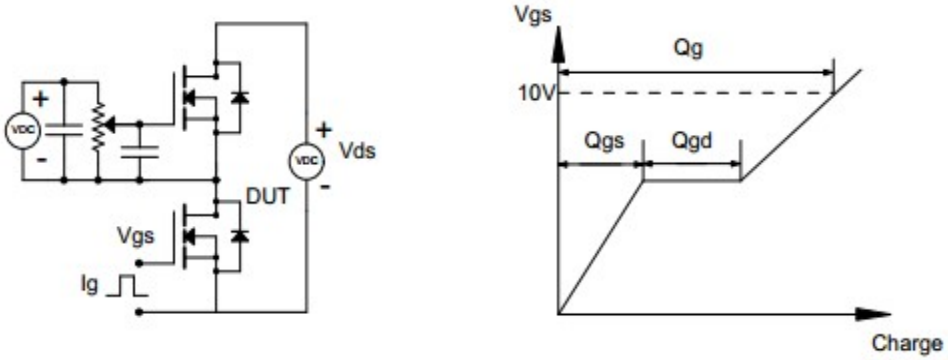


Breakdown Voltage Vs Junction Temperature

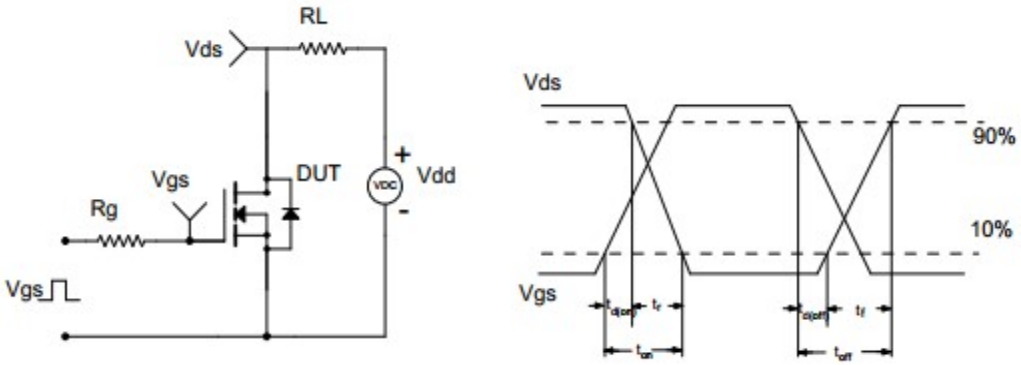
Note： The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Test Circuit & Waveform

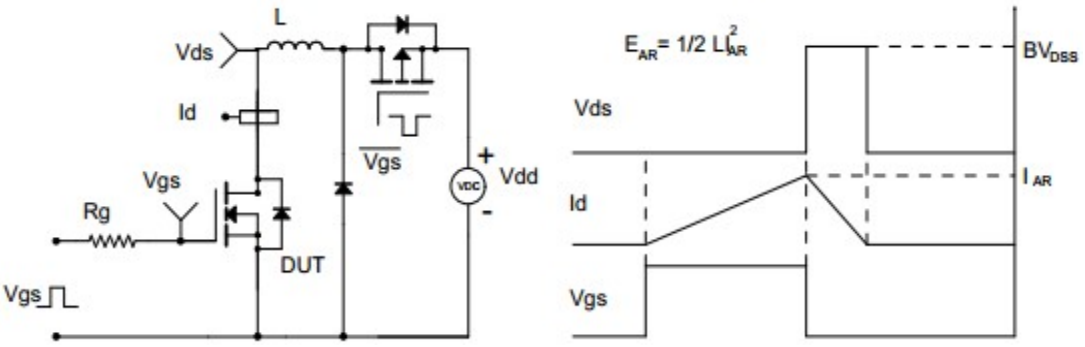
Gate Charge Test Circuit & Waveform



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	2.20		2.40	L	9.80		10.40
A1	0.00		0.13	L1		2.90	
b	0.66		0.86	L2	1.40		1.60
c	0.46		0.58	L3		1.80	
D	6.50		6.70	L4	0.60		1.00
D1	5.10		5.46	L5	0.90		1.25
D2		4.83		Φ	1.1		1.30
E	6.00		6.20	θ	0°		8°
e	2.19		2.39	V		5.35