

## » Applications

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

## » Product Summary

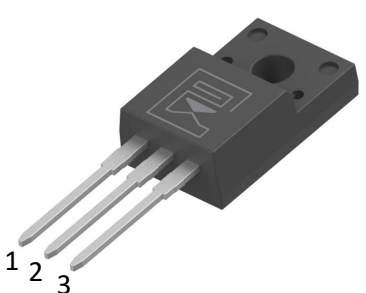
$V_{DS} @ T_{J,max}$	550	V
$I_D$	20	A
$R_{DS(ON), Typ @ 10V}$	0.18	$\Omega$
$Q_g$	23	nC

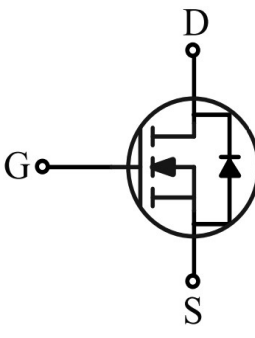
## » Features

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



### TO-220F





Gate: 1  
Drain: 2  
Source: 3

## » Package Marking and Ordering Information

Ordering code	Marking	Package	Packaging	Min. package quantity
MHF190R50CFD2	MHF190R50CFD2	TO-220F	Tube	1000

### » Absolute Maximum Ratings (Tc=25°C 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°C (Note 1)	$I_D$	20	A
Continuous Drain Current Tc=100°C (Note 1)		13	
Drain Current-Pulsed (Note 1)	$I_{DM}$	65	A
Total Dissipation	$P_D$	33	W
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-55-150	°C
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	$R_{\theta JC}$	3.8	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	80	°C/W

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

Note 2:  $V_{DD}=100V$ ,  $T_{ch}=25^\circ C$ (initial),  $L=0.5mH$ ,  $R_g=25\Omega$ .

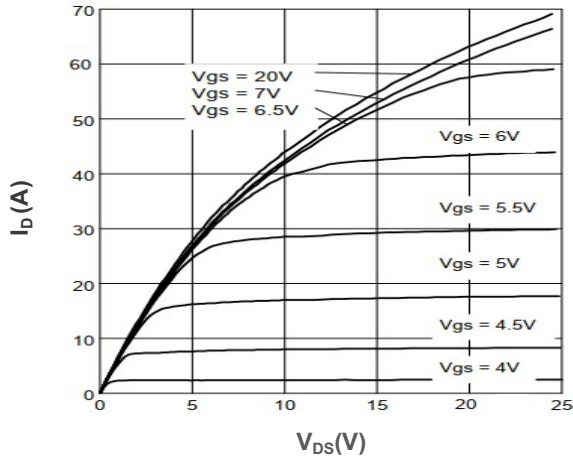
Note: This transistor is sensitive to electrostatic discharge and should be handled with care.

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

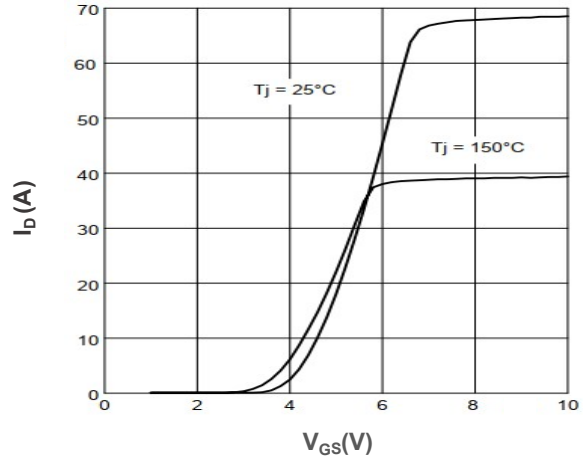
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	500	-	-	V
		T <sub>j</sub> =150°C	550	-	-	
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	5	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	2.1	3.1	4.1	V
Drain-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	0.18	0.19	Ω
		T <sub>j</sub> =150°C	-	0.43	-	
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	1050	-	pF
Output Capacitance	C <sub>oss</sub>		-	1160	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	20	-	pF
Gate Resistance	R <sub>g</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1.0MHz	-	2.5	-	Ω
<b>Switching Paramters</b>						
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V, R <sub>G</sub> =2Ω	-	20	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	5	-	ns
Turn-Off Delay Time	t <sub>d(off)</sub>		-	35	-	ns
Turn-Off Fall Time	t <sub>f</sub>		-	5	-	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V	-	23	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	8	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	7	-	nC
<b>Source-Drain Characteristics</b>						
Max. Diode Forward Current	I <sub>S</sub>		-	-	20	A
Max. Pulsed Forward Current	I <sub>SM</sub>		-	-	65	A
Diode Forward Voltage	V <sub>sd</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A	-	0.9	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	V <sub>R</sub> =300V, I <sub>F</sub> =10A, di/dt=100A/μs	-	115	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	0.6	-	μC



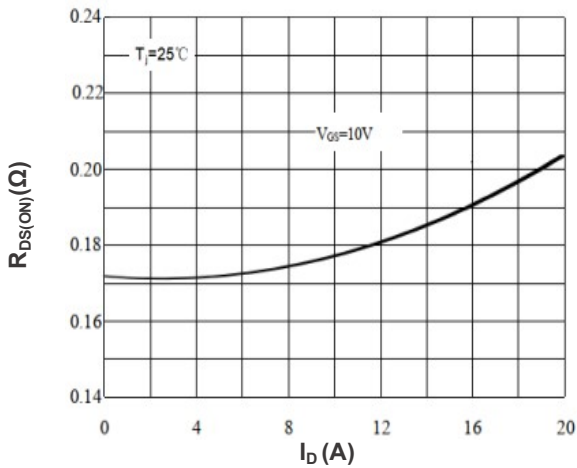
Characteristics Curves



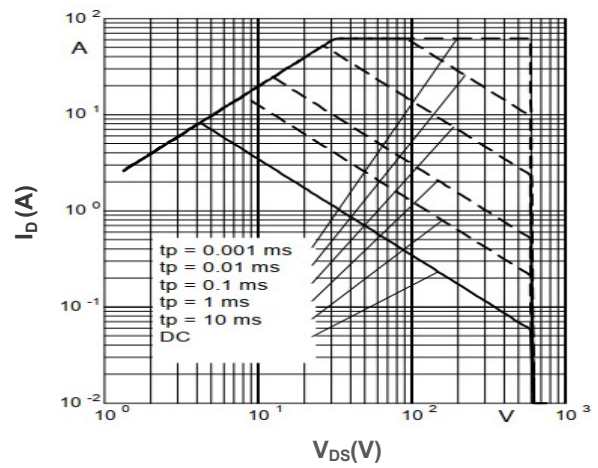
Output Characteristics



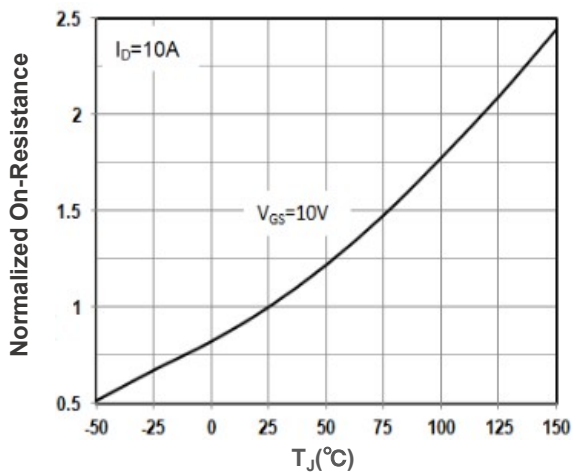
Transfer Characteristics



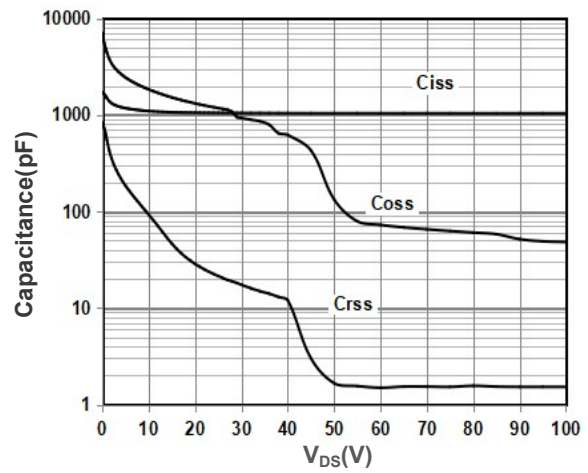
On Resistance Vs Drain Current



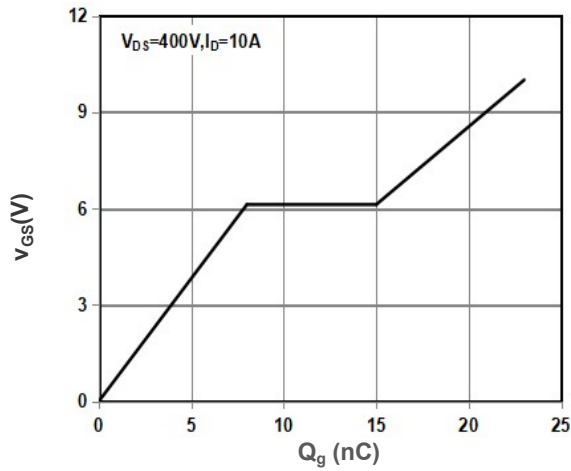
Maximum Safe Operating Area



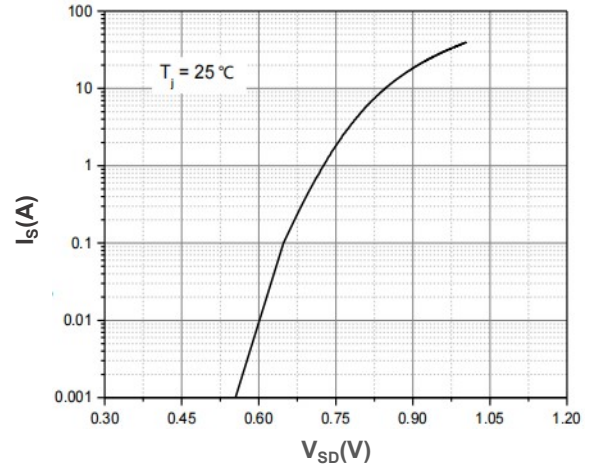
Rdson-JunctionTemperature



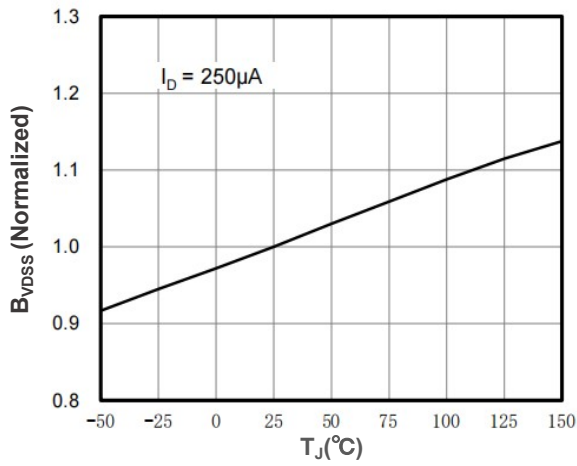
Capacitance



Gate Charge Waveform



Source-Drain Diode Forward Voltage



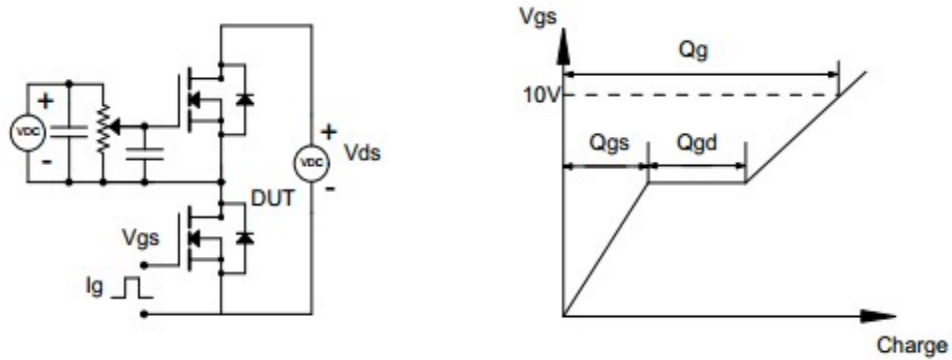
Breakdown Voltage Vs Junction Temperature

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

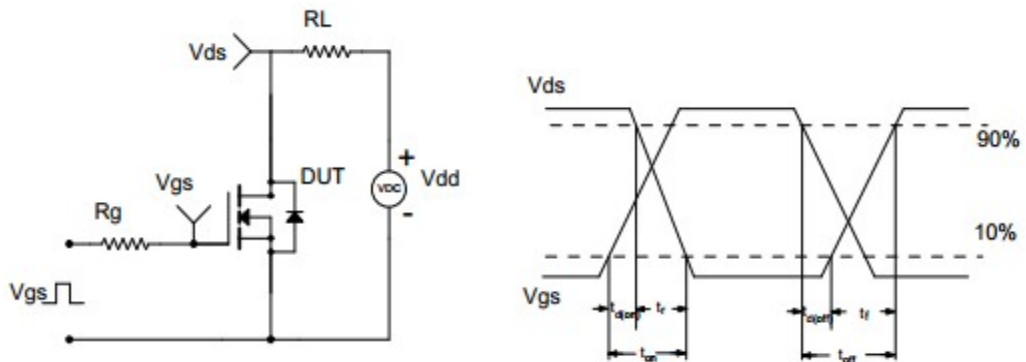


Test Circuit & Waveform

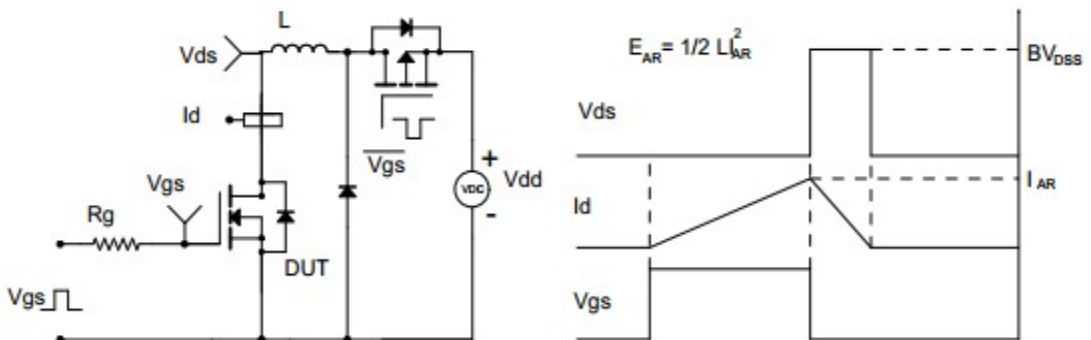
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform





TO-220F Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.5		4.9	E1	6.5	7	7.5
A1	2.3		2.9	e	2.44	2.54	2.64
b	0.65		0.9	L	12.5		14.3
b1	1.1		1.7	L1	9.45		10.05
b2	1.2		1.4	L2	15		16
c	0.35		0.65	L3	3.2		4.4
D	14.5		16.5	ΦP	3		3.3
D1	6.1		6.9	Q	2.5		2.9
E	9.6		10.3				

