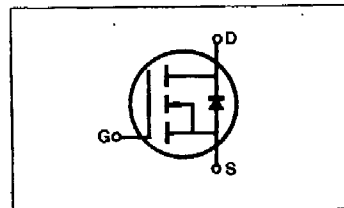
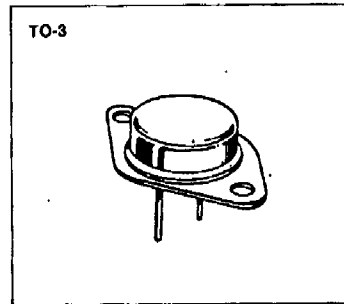


**IRF450/451/452/453** **N-CHANNEL POWER MOSFETS**

**FEATURES**

- Low  $R_{DS(on)}$  at high voltage
- Improved inductive ruggedness
- Excellent high voltage stability
- Fast switching times
- Rugged polysilicon gate cell structure
- Low input capacitance
- Extended safe operating area
- Improved high temperature reliability
- TO-3 package (High voltage)



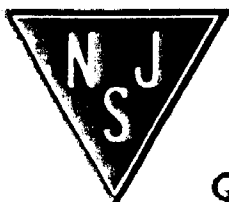
**PRODUCT SUMMARY**

Part Number	$V_{DS}$	$R_{DS(on)}$	$I_D$
IRF250	500V	0.4 $\Omega$	13A
IRF251	450V	0.4 $\Omega$	13A
IRF252	500V	0.5 $\Omega$	12A
IRF253	450V	0.5 $\Omega$	12A

**MAXIMUM RATINGS**

Characteristic	Symbol	IRF450	IRF451	IRF452	IRF453	Unit
Drain-Source Voltage (1)	$V_{DSS}$	500	450	500	450	Vdc
Drain-Gate Voltage ( $R_{GS}=1.0M\Omega$ ) (1)	$V_{DGR}$	500	450	500	450	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$				Vdc
Continuous Drain Current $T_C=25^\circ C$	$I_D$	13	13	12	12	Adc
Continuous Drain Current $T_C=100^\circ C$	$I_D$	8.0	8.0	7.0	7.0	Adc
Drain Current—Pulsed (3)	$I_{DM}$	52	52	48	48	Adc
Gate Current—Pulsed	$I_{GM}$	$\pm 1.5$				Adc
Total Power Dissipation @ $T_C=25^\circ C$	$P_D$	150				Watts
Derate above $25^\circ C$		1.2				W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to 150				$^\circ C$
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	$T_L$	300				$^\circ C$

Notes: (1)  $T_J=25^\circ C$  to  $150^\circ C$   
(2) Pulse test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$   
(3) Repetitive rating: Pulse width limited by max. junction temperature



NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

# IRF450/451/452/453

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	IRF450	500	—	—	V	V <sub>GS</sub> =0V I <sub>D</sub> =250μA
		IRF452					
		IRF451	450	—	—	V	
		IRF453					
Gate Threshold Voltage	V <sub>GS(th)</sub>	ALL	2.0	—	4.0	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
Gate-Source Leakage Forward	I <sub>GSS</sub>	ALL	—	—	100	nA	V <sub>GS</sub> =20V
Gate-Source Leakage Reverse	I <sub>GSS</sub>	ALL	—	—	-100	nA	V <sub>GS</sub> =-20V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	ALL	—	—	250	μA	V <sub>DS</sub> =Max. Rating, V <sub>GS</sub> =0V
			—	—	1000	μA	V <sub>DS</sub> =Max. Rating×0.8, V <sub>GS</sub> =0V, T <sub>C</sub> =125°C
On-State Drain-Source Current (2)	I <sub>D(on)</sub>	IRF450	13	—	—	A	V <sub>DS</sub> >I <sub>D(on)</sub> ×R <sub>DS(on)</sub> max., V <sub>GS</sub> =10V
		IRF451					
		IRF452	12	—	—	A	
		IRF453					
Static Drain-Source On-State Resistance (2)	R <sub>DS(on)</sub>	IRF450	—	0.38	0.4	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =7.0A
		IRF451					
		IRF452	—	0.4	0.5	Ω	
		IRF453					
Forward Transconductance (2)	g <sub>fs</sub>	ALL	6.0	10.8	—	Ω	V <sub>DS</sub> >I <sub>D(on)</sub> ×R <sub>DS(on)</sub> max., I <sub>D</sub> =7.0A
Input Capacitance	C <sub>iss</sub>	ALL	—	2850	3000	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz
Output Capacitance	C <sub>oss</sub>	ALL	—	350	600	pF	
Reverse Transfer Capacitance	C <sub>ras</sub>	ALL	—	150	200	pF	
Turn-On Delay Time	t <sub>d(on)</sub>	ALL	—	—	35	ns	
Rise Time	t <sub>r</sub>	ALL	—	—	50	ns	V <sub>DD</sub> =0.5BV <sub>DSS</sub> , I <sub>D</sub> =7.0A, Z <sub>O</sub> =4.7 Ω (MOSFET switching times are essentially independent of operating temperature.)
Turn-Off Delay Time	t <sub>d(off)</sub>	ALL	—	—	150	ns	
Fall Time	t <sub>f</sub>	ALL	—	—	70	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q <sub>g</sub>	ALL	—	77	120	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =16A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature. See Fig. 8 page 21)
Gate-Source Charge	Q <sub>gs</sub>	ALL	—	11	—	nC	
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>	ALL	—	86	—	nC	

## THERMAL RESISTANCE

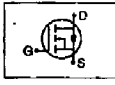
Junction-to-Case	R <sub>thJC</sub>	ALL	—	—	0.83	K/W	
Case-to-Sink	R <sub>thCS</sub>	ALL	—	0.1	—	K/W	Mounting surface flat, smooth, and greased
Junction-to-Ambient	R <sub>thJA</sub>	ALL	—	—	30	K/W	Free Air Operation

- Notes: (1) T<sub>J</sub>=25°C to 150°C  
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%  
(3) Repetitive rating: Pulse width limited by max. junction temperature

# IRF450/451/452/453

# N-CHANNEL POWER MOSFETS

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	$I_S$	IRF450	—	—	13	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRF451	—	—	13	A	
		IRF452	—	—	12	A	
Pulse Source Current (Body Diode) (3)	$I_{SM}$	IRF450	—	—	52	A	
		IRF451	—	—	52	A	
		IRF452	—	—	48	A	
Diode Forward Voltage (2)	$V_{SD}$	IRF450	—	—	1.4	V	$T_C=25^\circ\text{C}$ , $I_S=13\text{A}$ , $V_{GS}=0\text{V}$
		IRF451	—	—	1.4	V	$T_C=25^\circ\text{C}$ , $I_S=12\text{A}$ , $V_{GS}=0\text{V}$
		IRF452	—	—	1.3	V	$T_C=25^\circ\text{C}$ , $I_S=12\text{A}$ , $V_{GS}=0\text{V}$
Reverse Recovery Time	$t_{rr}$	ALL	—	1300	—	ns	$T_J=150^\circ\text{C}$ , $I_F=13\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{s}$

Notes: (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$  (2) Pulse test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating: Pulse width limited by max. junction temperature

