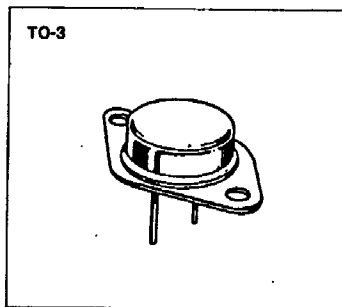


IRF440/441/442/443

**N-CHANNEL
 POWER MOSFETS**

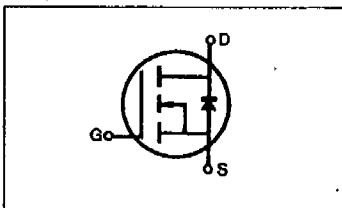
FEATURES

- 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

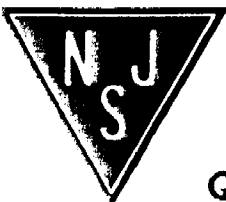
Part Number	V _{DS}	R _{DS(on)}	I _D
IRF440	500V	0.85Ω	8.0A
IRF441	450V	0.85Ω	8.0A
IRF442	500V	1.10Ω	7.0A
IRF443	450V	1.10Ω	7.0A



MAXIMUM RATINGS

Characteristic	Symbol	IRF440	IRF441	IRF442	IRF443	Unit
Drain-Source Voltage (1)	V _{DSS}	500	450	500	450	V _{dc}
Drain-Gate Voltage (R _{GS} =1.0MΩ) (1)	V _{DGR}	500	450	500	450	V _{dc}
Gate-Source Voltage	V _{GS}	±20				V _{dc}
Continuous Drain Current T _C =25°C	I _D	8.0	8.0	7.0	7.0	A _{dc}
Continuous Drain Current T _C =100°C	I _D	5.0	5.0	4.0	4.0	A _{dc}
Drain Current—Pulsed (3)	I _{DM}	32	32	28	28	A _{dc}
Gate Current—Pulsed	I _{GM}	±1.6				A _{dc}
Total Power Dissipation @ T _C =25°C Derate above 25°C	P _D	125 1.0				Watts W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to 150				°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T _L	300				°C

Notes: (1) T_J=25°C to 150°C
 (2) Pulse test: Pulse width≤300μs, Duty Cycle≤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.

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ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	IRF440	500	—	—	V	V _{GS} =0V I _D =250μA
		IRF442					
		IRF441	450	—	—	V	
		IRF443					
Gate Threshold Voltage	V _{GS(th)}	ALL	2.0	—	4.0	V	V _{DS} =V _{GS} , I _D =250μA
Gate-Source Leakage Forward	I _{GSS}	ALL	—	—	100	nA	V _{GS} =20V
Gate-Source Leakage Reverse	I _{GSS}	ALL	—	—	-100	nA	V _{GS} =-20V
Zero Gate Voltage Drain Current	I _{DSS}	ALL	—	—	250	μA	V _{DS} =Max. Rating, V _{GS} =0V
			—	—	1000	μA	V _{DS} =Max. Rating×0.8, V _{GS} =0V, T _C =125°C
On-State Drain-Source Current (2)	I _{D(on)}	IRF440	8.0	—	—	A	V _{DS} >I _{D(on)} ×R _{DS(on) max.} , V _{GS} =10V
		IRF441					
		IRF442	7.0	—	—	A	
		IRF443					
Static Drain-Source On-State Resistance (2)	R _{DS(on)}	IRF440	—	0.6	0.85	Ω	V _{GS} =10V, I _D =4.0A
		IRF441					
		IRF442	—	1.0	1.1	Ω	
		IRF443					
Forward Transconductance (2)	g _f	ALL	4.0	6.5	—	Ω	V _{DS} >I _{D(on)} ×R _{DS(on) max.} , I _D =4.0A
Input Capacitance	C _{iss}	ALL	—	1200	1600	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
Output Capacitance	C _{oss}	ALL	—	230	350	pF	
Reverse Transfer Capacitance	C _{rss}	ALL	—	65	150	pF	
Turn-On Delay Time	t _{d(on)}	ALL	—	—	35	ns	V _{DD} =0.5BV _{DSS} , I _D =4.0A, Z _O =4.7 Ω (MOSFET switching times are essentially independent of operating temperature.)
Rise Time	t _r	ALL	—	—	15	ns	
Turn-Off Delay Time	t _{d(off)}	ALL	—	—	90	ns	
Fall Time	t _f	ALL	—	—	30	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	ALL	—	34	60	nC	
Gate-Source Charge	Q _{gs}	ALL	—	6.0	—	nC	V _{GS} =10V, I _D =10A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Gate-Drain ("Miller") Charge	Q _{gd}	ALL	—	28	—	nC	

THERMAL RESISTANCE

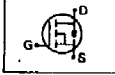
Junction to Case	R _{thJC}	ALL	—	—	1.0	K/W	
Case-to-Sink	R _{thCS}	ALL	—	0.1	—	K/W	Mounting surface flat, smooth, and greased
Junction-to-Ambient	R _{thJA}	ALL	—	—	30	K/W	Free Air Operation

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

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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	IRF440 IRF441	—	—	8.0	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRF442 IRF443	—	—	7.0	A	
Pulse Source Current (Body Diode) (3)	I_{SM}	IRF440 IRF441	—	—	32	A	
		IRF442 IRF443	—	—	28	A	
Diode Forward Voltage (2)	V_{SD}	IRF440 IRF441	—	—	2.0	V	$T_C=25^\circ\text{C}$, $I_S=8.0\text{A}$, $V_{GS}=0\text{V}$
		IRF442 IRF443	—	—	1.9	V	$T_C=25^\circ\text{C}$, $I_S=7.0\text{A}$, $V_{GS}=0\text{V}$
Reverse Recovery Time	t_{rr}	ALL	—	1100	—	ns	$T_J=150^\circ\text{C}$, $I_F=8.0\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$

Notes: (1) $T_J=25^\circ\text{C}$ to 150°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

