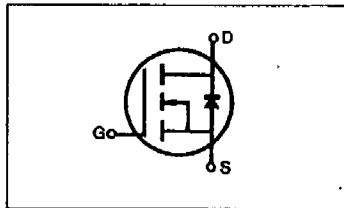
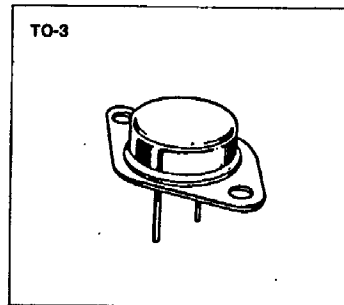


IRF440/441/442/443

**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)



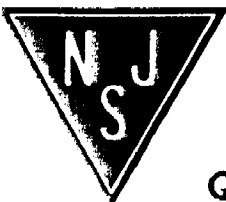
PRODUCT SUMMARY

| 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} | ±1.5 | | | | 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.

IRF440/441/442/443

N-CHANNEL POWER MOSFETS

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 _{fs} | 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

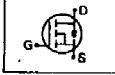
| | | | | | | | |
|---------------------|-------------------|-----|---|-----|-----|-----|--|
| Junction to Case | R _{thJC} | ALL | — | — | 1.0 | K/W | |
| Case-to-Sink | R _{thCS} | ALL | — | 0.1 | — | K/W | Mounting surface flat, smooth, and greased |
| Junction-to-Ambient | R _{thJA} | ALL | — | —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

IRF440/441/442/443

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

