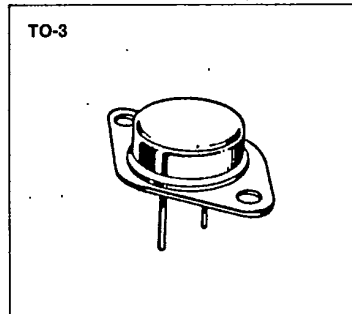
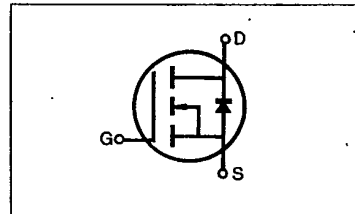


IRF250/251/252/253**N-CHANNEL
POWER MOSFETS****FEATURES**

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

**PRODUCT SUMMARY**

| Part Number | V_{DS} | $R_{DS(on)}$ | I_D |
|-------------|----------|----------------|-------|
| IRF250 | 200V | 0.085 Ω | 30A |
| IRF251 | 150V | 0.085 Ω | 30A |
| IRF252 | 200V | 0.12 Ω | 25A |
| IRF253 | 150V | 0.12 Ω | 25A |

**MAXIMUM RATINGS**

| Characteristic | Symbol | IRF250 | IRF251 | IRF252 | IRF253 | Unit |
|---|----------------|------------|--------|--------|--------|---------------|
| Drain-Source Voltage (1) | V_{DS} | 200 | 150 | 200 | 150 | Vdc |
| Drain-Gate Voltage ($R_{GS}=1.0M\Omega$) (1) | V_{DGR} | 200 | 150 | 200 | 150 | Vdc |
| Gate-Source Voltage | V_{GS} | ± 20 | | | | Vdc |
| Continuous Drain Current $T_C=25^\circ C$ | I_D | 30 | 30 | 25 | 25 | Adc |
| Continuous Drain Current $T_C=100^\circ C$ | I_D | 19 | 19 | 16 | 16 | Adc |
| Drain Current—Pulsed (3) | I_{DM} | 120 | 120 | 100 | 100 | Adc |
| Gate Current—Pulsed | I_{GM} | ± 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



SAMSUNG SEMICONDUCTOR

103

4

IRF250/251/252/253

N-CHANNEL
POWER MOSFETSELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

| Characteristic | Symbol | Type | Min | Typ | Max | Units | Test Conditions |
|---|---------------------|------------------|-----|------|-------|-------|--|
| Drain-Source Breakdown Voltage | BV _{DSS} | IRF250 IRF252 | 200 | — | — | V | V _{GS} =0V |
| | | IRF251 IRF253 | 150 | — | — | V | I _D =250μA |
| | | ALL | — | — | — | — | V _{DS} =V _{GS} , I _D =250μA |
| 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)} | IRF250 IRF251 | 30 | — | — | A | V _{DS} >I _{D(on)} ×R _{DS(on) max.} , V _{GS} =10V |
| | | IRF252 IRF253 | 25 | — | — | A | |
| | | ALL | — | — | — | — | |
| Static Drain-Source On-State Resistance (2) | R _{DS(on)} | IRF250 IRF251 | — | 0.07 | 0.085 | Ω | V _{GS} =10V; I _D =16A |
| | | IRF252 IRF253 | — | 0.09 | 0.120 | Ω | |
| | | ALL | — | — | — | — | |
| Forward Transconductance (2) | g _{fs} | ALL | 8.0 | 12.5 | — | Ω | V _{DS} >I _{D(on)} ×R _{DS(on) max.} , I _D =16A |
| Input Capacitance | C _{iss} | ALL | — | 2640 | 3000 | pF | V _{GS} =0V, V _{DS} =25V, f=1.0MHz |
| Output Capacitance | C _{oss} | ALL | — | 800 | 1200 | pF | |
| Reverse Transfer Capacitance | C _{rss} | ALL | — | 300 | 500 | pF | |
| Turn-On Delay Time | t _{d(on)} | ALL | — | — | 35 | ns | V _{DD} =0.5BV _{DSS} , I _D =16A, Z _O =4.7 Ω (MOSFET switching times are essentially independent of operating temperature.) |
| Rise Time | t _r | ALL | — | — | 100 | ns | |
| Turn-Off Delay Time | t _{d(off)} | ALL | — | — | 125 | ns | |
| Fall Time | t _f | ALL | — | — | 100 | ns | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | Q _g | ALL | — | 68 | 120 | nC | V _{GS} =10V, I _D =38A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.) |
| Gate-Source Charge | Q _{gs} | ALL | — | 18 | — | nC | |
| Gate-Drain ("Miller") Charge | Q _{gd} | ALL | — | 50 | — | nC | |

THERMAL RESISTANCE

| | | | | | | | |
|---------------------|-------------------|-----|---|-----|------|-----|--|
| Junction-to-Case | R _{thJC} | ALL | — | — | 0.83 | 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_J=25°C to 150°C

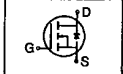
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

(3) Repetitive rating: Pulse width limited by max. junction temperature

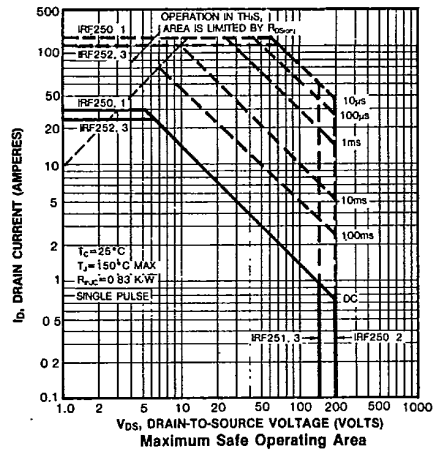
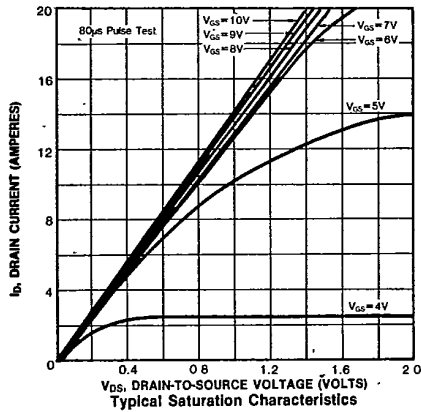
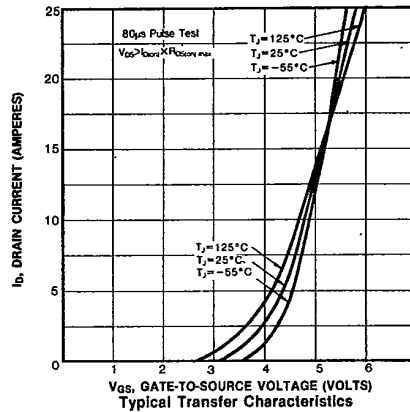
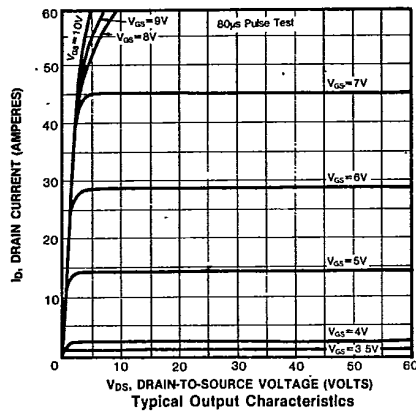
IRF250/251/252/253

**N-CHANNEL
POWER MOSFETS**

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

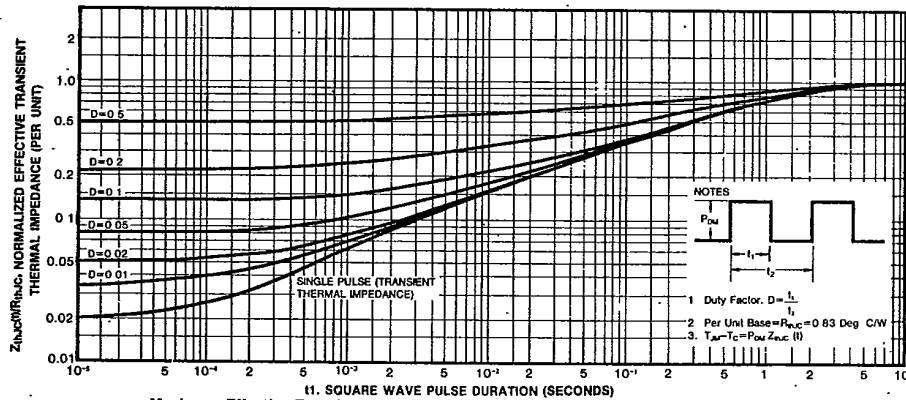
| Characteristic | Symbol | Type | Min | Typ | Max | Units | Test Conditions |
|--|-----------------|--------|-----|-----|--|-------|--|
| Continuous Source Current (Body Diode) | I _S | IRF250 | — | — | 30 | A | Modified MOSFET symbol showing the integral reverse P-N junction rectifier  |
| | | IRF251 | — | — | 30 | A | |
| | | IRF252 | — | — | 25 | A | |
| | | IRF253 | — | — | 25 | A | |
| Pulse Source Current (Body Diode) (3) | I _{SM} | IRF250 | — | — | 120 | A | |
| | | IRF251 | — | — | 120 | A | |
| | | IRF252 | — | — | 100 | A | |
| | | IRF253 | — | — | 100 | A | |
| Diode Forward Voltage (2) | V _{SD} | IRF250 | — | — | 2.0 | V | T _C =25°C, I _S =30A, V _{GS} =0V |
| | | IRF251 | — | — | 2.0 | V | T _C =25°C, I _S =30A, V _{GS} =0V |
| | | IRF252 | — | — | 1.8 | V | T _C =25°C, I _S =25A, V _{GS} =0V |
| IRF253 | — | — | 1.8 | V | T _C =25°C, I _S =25A, V _{GS} =0V | | |
| Reverse Recovery Time | t _{rr} | ALL | — | 750 | — | ns | T _J =150°C, I _F =30A, dI _F /dt=100A/μs |

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

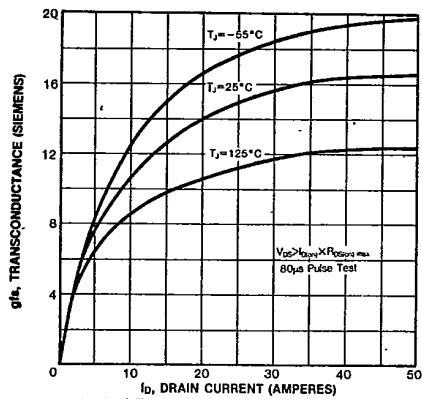


IRF250/251/252/253

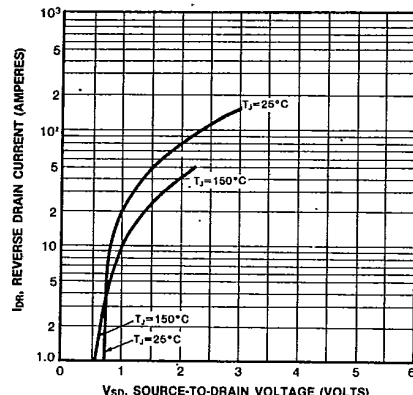
N-CHANNEL POWER MOSFETS



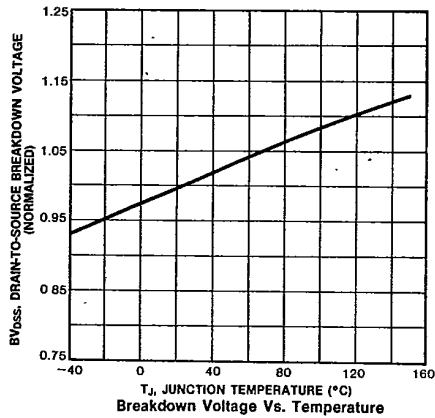
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



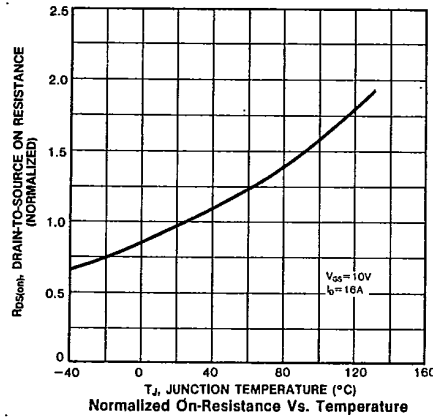
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature



IRF250/251/252/253

**N-CHANNEL
POWER MOSFETS**

