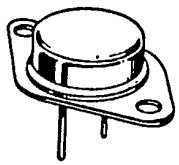
# IRF340/341/342/343

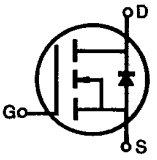
## N-CHANNEL POWER MOSFETS

### 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 (Standard)

TO-3






### PRODUCT SUMMARY

| Part Number | $V_{DS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| IRF340 | 400V | 0.55 Ω | 10A |
| IRF341 | 350V | 0.55 Ω | 10A |
| IRF342 | 400V | 0.80 Ω | 8.0A |
| IRF343 | 350V | 0.80 Ω | 8.0A |

### MAXIMUM RATINGS

| Characteristic | Symbol | IRF340 | IRF341 | IRF342 | IRF343 | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Voltage (1) | $V_{DSS}$ | 400 | 350 | 400 | 350 | Vdc |
| Drain-Gate Voltage ($R_{GS}$=1.0MΩ)(1) | $V_{DGR}$ | 400 | 350 | 400 | 350 | Vdc |
| Gate-Source Voltage | $V_{GS}$ | ±20 | | | | Vdc |
| Continuous Drain Current $T_C$=25°C | $I_D$ | 10 | 10 | 8.0 | 8.0 | Adc |
| Continuous Drain Current $T_C$=100°C | $I_D$ | 6.0 | 6.0 | 5.0 | 5.0 | Adc |
| Drain Current—Pulsed (3) | $I_{DM}$ | 40 | 40 | 32 | 32 | Adc |
| Gate Current—Pulsed | $I_{GM}$ | ±1.5 | | | | Adc |
| Total Power Dissipation @ $T_C$=25°C<br>Derate above 25°C | $P_D$ | 125<br>1.0 | | | | Watts<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, Tstg | −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

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

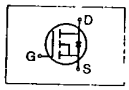
| Characteristic | Symbol | Type | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | IRF340 IRF342 | 400 | — | — | V | $V_{GS}$=0V |
| | | IRF341 IRF343 | 350 | — | — | V | $I_D$=250μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 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) | $I_{D(on)}$ | IRF340 IRF341 | 10 | — | — | A | $V_{DS}$>$I_{D(on)}$×$R_{DS(on)\ max.}$, $V_{GS}$=10V |
| | | IRF342 IRF343 | 8.0 | — | — | A | |
| Static Drain-Source On-State Resistance (2) | $R_{DS(on)}$ | IRF340 IRF341 | — | 0.30 | 0.55 | Ω | $V_{GS}$=10V, $I_D$=5.0A |
| | | IRF342 IRF343 | — | 0.60 | 0.80 | Ω | |
| Forward Transconductance (2) | $g_{fs}$ | ALL | 4.0 | 7.0 | — | Ʊ | $V_{DS}$>$I_{D(on)}$×$R_{DS(on)\ max.}$, $I_D$=5.0A |
| Input Capacitance | $C_{iss}$ | ALL | — | 1300 | 1600 | pF | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz |
| Output Capacitance | $C_{oss}$ | ALL | — | 250 | 450 | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | ALL | — | 50 | 150 | pF | |
| Turn-On Delay Time | $t_{d(on)}$ | ALL | — | — | 35 | ns | $V_{DD}$=0.5$BV_{DSS}$, $I_D$=5.0A, $Z_O$=4.7Ω (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 | — | — | 35 | ns | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | $Q_g$ | ALL | — | 41 | 60 | nC | $V_{GS}$=10V, $I_D$=12A, $V_{DS}$=0.8 Max. Rating (Gate charge is essentially independent of operating temperature.) |
| Gate-Source Charge | $Q_{gs}$ | ALL | — | 6.0 | — | nC | |
| Gate-Drain ("Miller") Charge | $Q_{gd}$ | ALL | — | 35 | — | nC | |

## THERMAL RESISTANCE

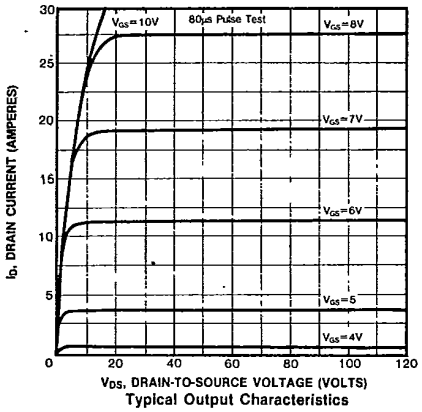
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Junction-to-Case | $R_{thJC}$ | ALL | — | — | 1.0 | K/W | |
| Case-to-Sink | $R_{thCS}$ | ALL | — | 0.1 | — | K/W | Mounting surface flat, smooth, and greased |
| Junction-to-Ambient | $R_{thJA}$ | ALL | — | — | 30 | K/W | Free Air Operation |

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

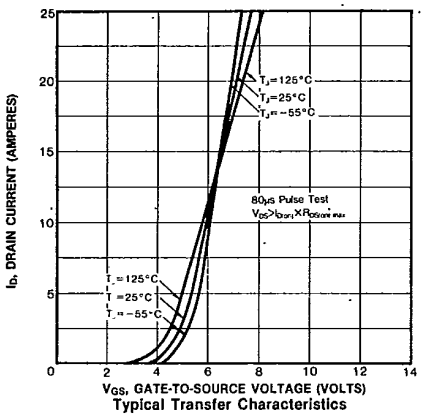
## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Characteristic | Symbol | Type | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| Continuous Source Current (Body Diode) | $I_S$ | IRF340 IRF341 | — | — | 10 | A | Modified MOSFET symbol showing the integral reverse P-N junction rectifier  |
| | | IRF342 IRF343 | — | — | 8.0 | A | |
| Pulse Source Current (Body Diode) (3) | $I_{SM}$ | IRF340 IRF341 | — | — | 40 | A | |
| | | IRF342 IRF343 | — | — | 32 | A | |
| Diode Forward Voltage (2) | $V_{SD}$ | IRF340 IRF341 | — | — | 2.0 | V | $T_C$=25°C, $I_S$=10A, $V_{GS}$=0V |
| | | IRF342 IRF343 | — | — | 1.9 | V | $T_C$=25°C, $I_S$=8.0A, $V_{GS}$=0V |
| Reverse Recovery Time | $t_{rr}$ | ALL | — | 800 | — | ns | $T_J$=150°C, $I_F$=10A, $dI_F/dt$=100A/μs |

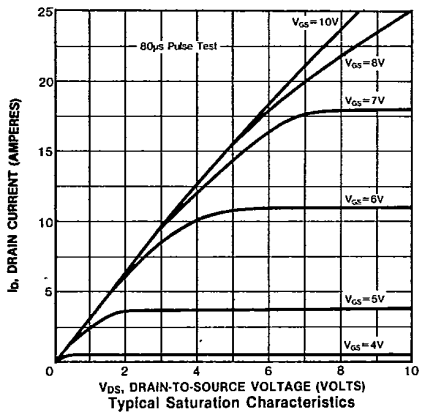
**Notes:** (1) $T_J$=25°C to 150°C (2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse width limited by max. junction temperature



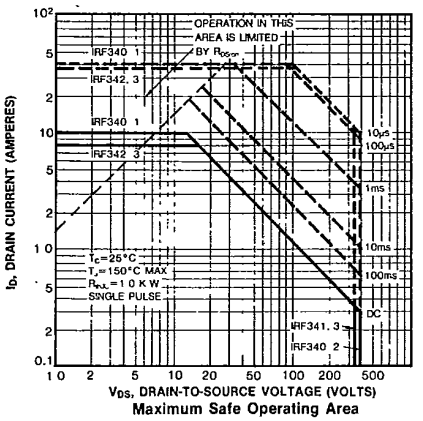
Typical Output Characteristics



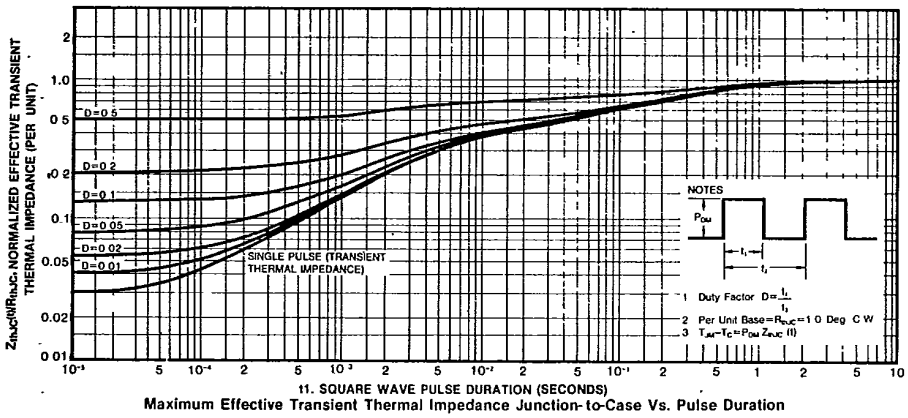
Typical Transfer Characteristics



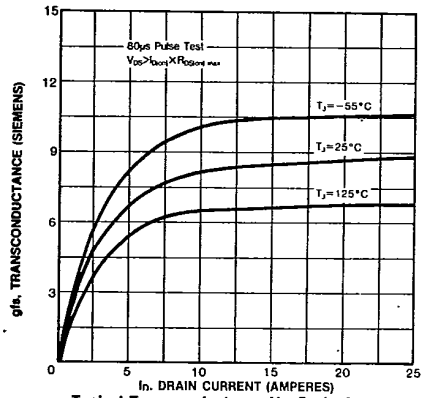
Typical Saturation Characteristics



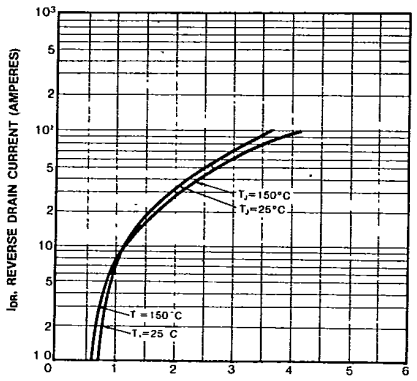
Maximum Safe Operating Area



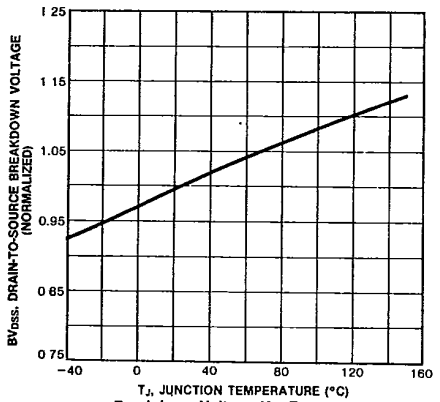
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



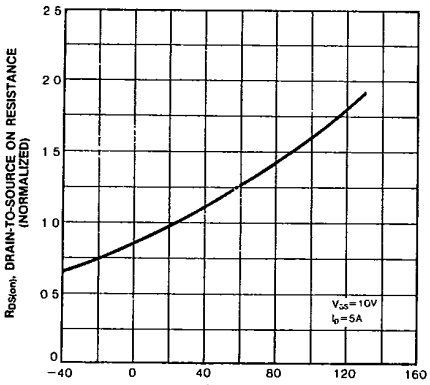
Typical Transconductance Vs. Drain Current



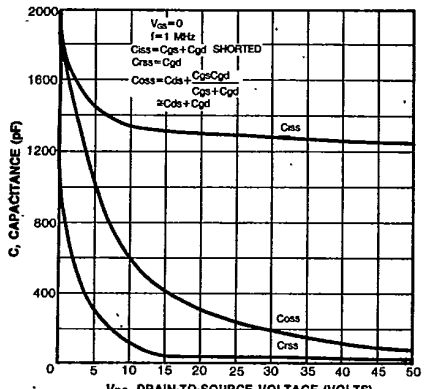
Typical Source—Drain Diode Forward Voltage



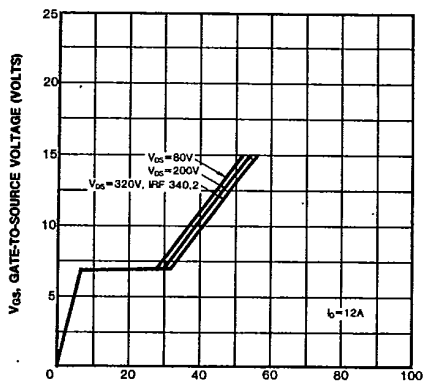
Breakdown Voltage Vs. Temperature



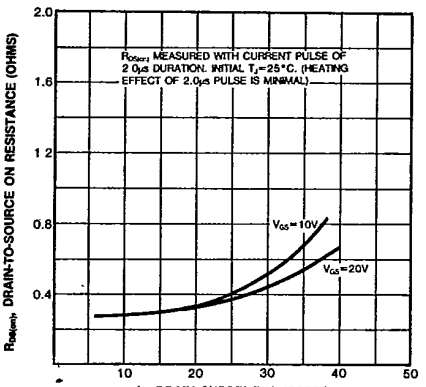
Normalized On-Resistance Vs. Temperature



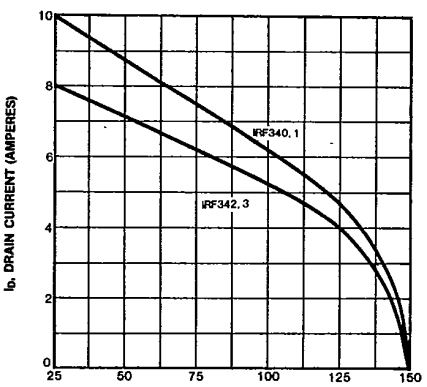
Typical Capacitance Vs. Drain to Source Voltage



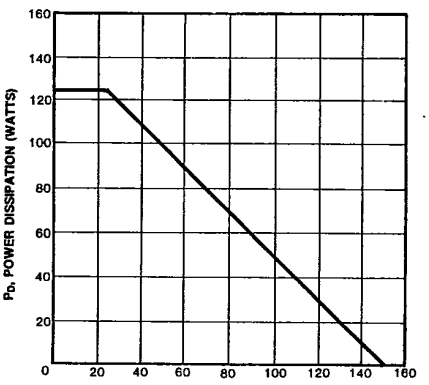
Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve

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