

FAIRCHILD

A Schlumberger Company

IRF130-133/IRF530-533 T-39-11

MTP20N08/20N10 T-39-13

**N-Channel Power MOSFETs,
20 A, 60-100 V**

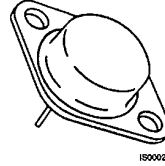
Power And Discrete Division

Description

These devices are n-channel, enhancement mode, power MOSFETs designed especially for high power, high speed applications, such as switching power supplies, UPS, AC and DC motor controls, relay and solenoid drivers and high energy pulse circuits.

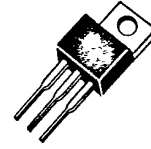
- Low $R_{DS(on)}$
- V_{GS} Rated at ± 20 V
- Silicon Gate for Fast Switching Speeds
- I_{DSS} , $V_{DS(on)}$ Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

TO-204AA



IRF130
IRF131
IRF132
IRF133

TO-220AB



IRF530
IRF531
IRF532
IRF533
MTP20N08
MTP20N10

Product Summary

| Part Number | V_{DSS} | $R_{DS(on)}$ | I_D at $T_C = 25^\circ C$ | I_D at $T_C = 100^\circ C$ | Case Style |
|-------------|-----------|---------------|-----------------------------|------------------------------|------------|
| IRF130 | 100 V | 0.18 Ω | 14 A | 9.0 A | TO-204AA |
| IRF131 | 60 V | 0.18 Ω | 14 A | 9.0 A | |
| IRF132 | 100 V | 0.25 Ω | 12 A | 8.0 A | |
| IRF133 | 60 V | 0.25 Ω | 12 A | 8.0 A | |
| IRF530 | 100 V | 0.18 Ω | 14 A | 9.0 A | TO-220AB |
| IRF531 | 60 V | 0.18 Ω | 14 A | 9.0 A | |
| IRF532 | 100 V | 0.25 Ω | 12 A | 8.0 A | |
| IRF533 | 60 V | 0.25 Ω | 12 A | 8.0 A | |
| MTP20N08 | 80 V | 0.15 Ω | 20 A | 11.5 A | |
| MTP20N10 | 100 V | 0.15 Ω | 20 A | 11.5 A | |

Notes

For information concerning connection diagram and package outline, refer to Section 7.

IRF130-133/IRF530-533

MTP20N08/20N10

T-39-11

T-39-13

Maximum Ratings

| Symbol | Characteristic | Rating IRF130/132 IRF530/532 MTP20N10 | Rating MTP20N08 | Rating IRF131/133 IRF531/533 | Unit |
|-----------------------------------|---|--|--------------------|------------------------------------|------|
| V _{DSS} | Drain to Source Voltage ¹ | 100 | 80 | 60 | V |
| V _{DGR} | Drain to Gate Voltage ¹ R _{GS} = 20 kΩ | 100 | 80 | 60 | V |
| V _{GS} | Gate to Source Voltage | ± 20 | ± 20 | ± 20 | V |
| T _J , T _{stg} | Operating Junction and Storage Temperatures | -55 to +150 | -55 to +150 | -55 to +150 | °C |
| T _L | Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5 s | 275 | 275 | 275 | °C |

Maximum Thermal Characteristics

| | | IRF130-133 IRF530-533 | MTP20N08/10 | |
|------------------|---|--------------------------|-------------|------|
| R _{θJC} | Thermal Resistance, Junction to Case | 1.67 | 1.25 | °C/W |
| P _D | Total Power Dissipation at T _C = 25°C | 75 | 100 | W |
| I _{DM} | Pulsed Drain Current ² | 60 | 60 | A |

Electrical Characteristics (T_C = 25°C unless otherwise noted)

| Symbol | Characteristic | Min | Max | Unit | Test Conditions |
|----------------------------|--|-----|-------|------|---|
| Off Characteristics | | | | | |
| V _{(BR)DSS} | Drain Source Breakdown Voltage ¹ IRF130/132/530/532/ MTP20N10 | 100 | | V | V _{GS} = 0 V, I _D = 250 μA |
| | MTP20N08 | 80 | | | |
| | IRF131/133/531/533 | 60 | | | |
| I _{DSS} | Zero Gate Voltage Drain Current | | 250 | μA | V _{DS} = Rated V _{DSS} , V _{GS} = 0 V |
| | | | 1000 | μA | V _{DS} = 0.8 × Rated V _{DSS} , V _{GS} = 0 V, T _C = 125°C |
| I _{GSS} | Gate-Body Leakage Current IRF130-133 | | ± 100 | nA | V _{GS} = ± 20 V, V _{DS} = 0 V |
| | IRF530-533/ MTP20N08/MTP20N10 | | ± 500 | | |

IRF130-133/IRF530-533
MTP20N08/20N10

T-39-11

T-39-13

Electrical Characteristics (Cont.) ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Characteristic | Min | Max | Unit | Test Conditions |
|--|--|-----|------|----------------|--|
| On Characteristics | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | | | V | $I_D = 250 \mu\text{A}$, $V_{DS} = V_{GS}$ |
| | IRF130/133/530/533 | 2.0 | 4.0 | | |
| | MTP20N08/20N10 | 2.0 | 4.5 | | |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance ² | | | Ω | $V_{GS} = 10 \text{ V}$, $I_D = 8.0 \text{ A}$ |
| | IRF130/131/530/531 | | 0.18 | | |
| | IRF132/133/532/533 | | 0.25 | | |
| | MTP20N08/20N10 | | 0.15 | | |
| $V_{DS(on)}$ | Drain-Source On-Voltage ² | | 1.5 | V | $V_{GS} = 10 \text{ V}$; $I_D = 10 \text{ A}$ |
| | MTP 20N08/20N10 | | 3.6 | V | $V_{GS} = 10 \text{ V}$; $I_D = 20 \text{ A}$ |
| | | | 3.0 | V | $V_{GS} = 10 \text{ V}$, $I_D = 10 \text{ A}$ $T_C = 100^\circ\text{C}$ |
| g_{fs} | Forward Transconductance | 4.0 | | S (Ω) | $V_{DS} = 10 \text{ V}$, $I_D = 8.0 \text{ A}$ |
| Dynamic Characteristics | | | | | |
| C_{iss} | Input Capacitance | | 800 | pF | $V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$ $f = 1.0 \text{ MHz}$ |
| C_{oss} | Output Capacitance | | 500 | pF | |
| C_{rss} | Reverse Transfer Capacitance | | 150 | pF | |
| Switching Characteristics ($T_C = 25^\circ\text{C}$, Figures 1, 2) ³ | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | | 30 | ns | $V_{DD} = 36 \text{ V}$, $I_D = 8.0 \text{ A}$ $V_{GS} = 10 \text{ V}$, $R_{GEN} = 15 \Omega$ $R_{GS} = 15 \Omega$ |
| t_r | Rise Time | | 75 | ns | |
| $t_{d(off)}$ | Turn-Off Delay Time | | 40 | ns | |
| t_f | Fall Time | | 45 | ns | |
| $t_{d(on)}$ | Turn-On Delay Time | | 50 | ns | $V_{DD} = 25 \text{ V}$, $I_D = 10 \text{ A}$ $V_{GS} = 10 \text{ V}$, $R_{GEN} = 50 \Omega$ $R_{GS} = 50 \Omega$ |
| t_r | Rise Time | | 450 | ns | |
| $t_{d(off)}$ | Turn-Off Delay Time | | 100 | ns | |
| t_f | Fall Time | | 200 | ns | |
| Q_g | Total Gate Charge | | 30 | nC | $V_{GS} = 10 \text{ V}$, $I_D = 18 \text{ A}$ $V_{DD} = 80 \text{ V}$ |

IRF130-133/IRF530-533
MTP20N08/20N10

T-39-11

T-39-13

Electrical Characteristics (Cont.) ($T_C = 25^\circ\text{C}$ unless otherwise noted)

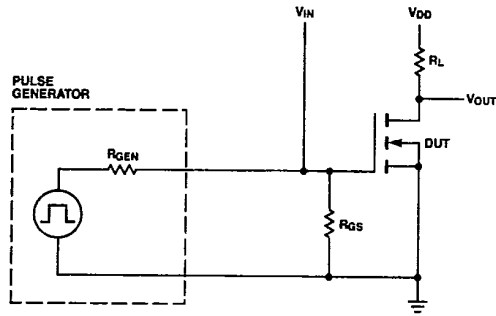
| Symbol | Characteristic | Typ | Max | Unit | Test Conditions |
|---|---|-----|-----|------|---|
| Source-Drain Diode Characteristics | | | | | |
| V_{SD} | Diode Forward Voltage IRF130/131/530/531 | 1.5 | 2.5 | V | $I_S = 14\text{ A}; V_{GS} = 0\text{ V}$ |
| | IRF132/133/532/533 | 1.5 | 2.3 | V | $I_S = 12\text{ A}; V_{GS} = 0\text{ V}$ |
| t_{rr} | Reverse Recovery Time | 300 | | ns | $I_S = 4\text{ A}; dI_S/dt = 25\text{ A}/\mu\text{S}$ |

Notes

- $T_J = +25^\circ\text{C}$ to $+150^\circ\text{C}$
- Pulse width limited by T_J .
- Switching time measurements performed on LEM TR-58 test equipment.

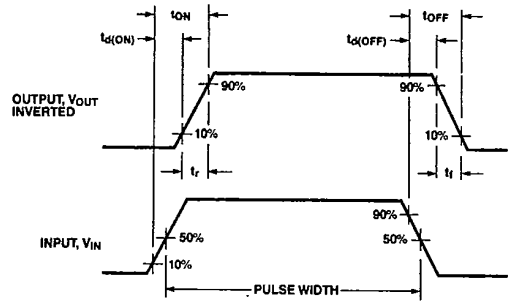
Typical Electrical Characteristics

Figure 1 Switching Test Circuit



CP04450F

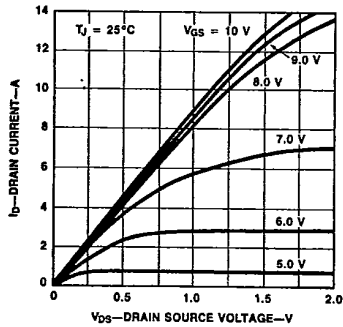
Figure 2 Switching Waveforms



WF00600F

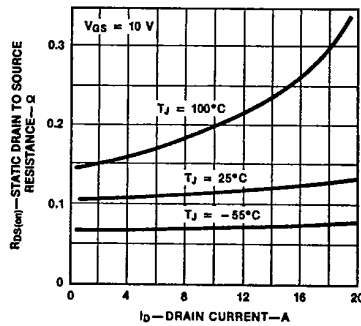
Typical Performance Curves

Figure 3 Output Characteristics



PC09960F

Figure 4 Static Drain to Source Resistance vs Drain Current



PC09970F

IRF130-133/IRF530-533
MTP20N08/20N10

T-39-11

T-39-13

Typical Performance Curves (Cont.)

Figure 5 Transfer Characteristics

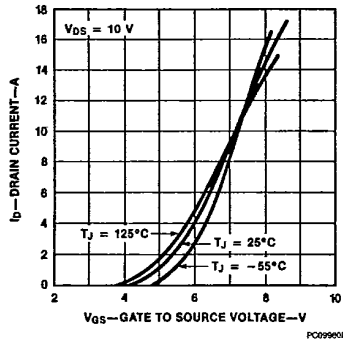


Figure 6 Temperature Variation of Gate to Source Threshold Voltage

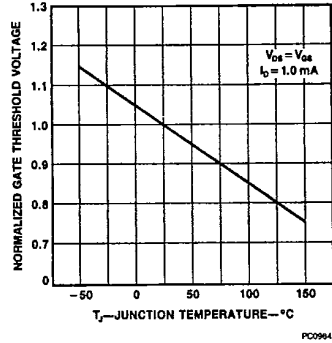


Figure 7 Capacitance vs Drain to Source Voltage

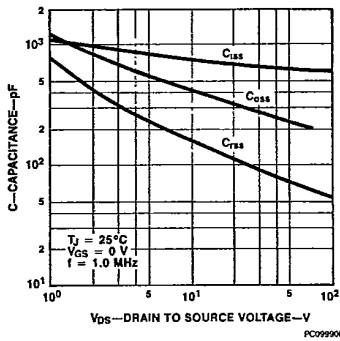


Figure 8 Gate to Source Voltage vs Total Gate Charge

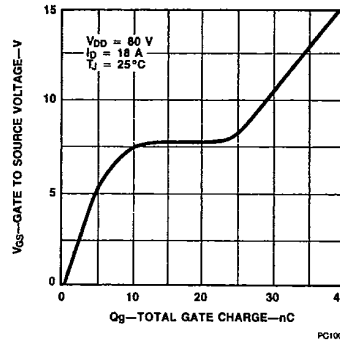


Figure 9 Forward Biased Safe Operating Area for IRF130-133 and IRF530-533

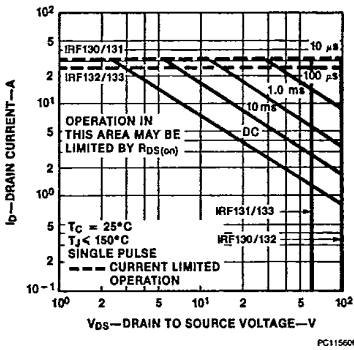
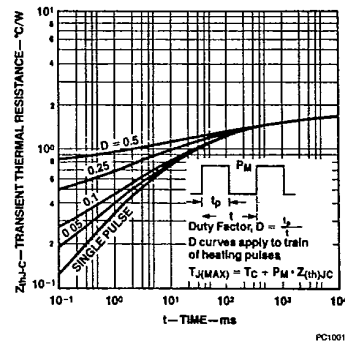


Figure 10 Transient Thermal Resistance vs Time for IRF130-133 and IRF530-533



T-39-13

Typical Performance Curves (Cont.)

Figure 11 Forward Biased Safe Operating Area for MTP20N08/20N10

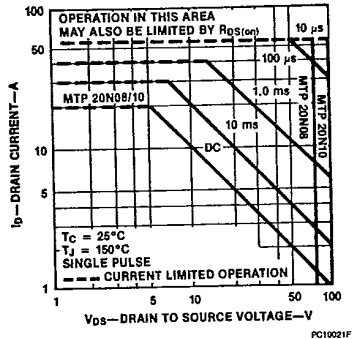
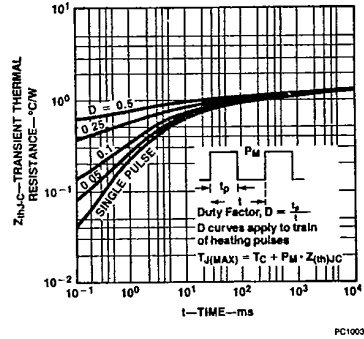


Figure 12 Transient Thermal Resistance vs Time for MTP20N08/20N10



2