

**FAIRCHILD**

A Schlumberger Company

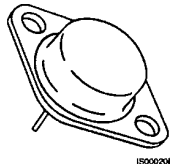
IRF130-133/IRF530-533 *T-39-11*  
 MTP20N08/20N10 *T-39-1*  
**N-Channel Power MOSFETs,**  
**20 A, 60-100 V**  
 Power And Discrete Division

**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.

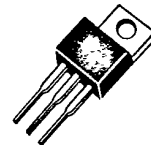
- Low  $R_{DS(on)}$
- $V_{GS}$  Rated at  $\pm 20$  V
- Silicon Gate for Fast Switching Speeds
- $I_{DSS}$ ,  $V_{DS(on)}$ , Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

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 $\Omega$	14 A	9.0 A	TO-204AA
IRF131	60 V	0.18 $\Omega$	14 A	9.0 A	
IRF132	100 V	0.25 $\Omega$	12 A	8.0 A	
IRF133	60 V	0.25 $\Omega$	12 A	8.0 A	
IRF530	100 V	0.18 $\Omega$	14 A	9.0 A	TO-220AB
IRF531	60 V	0.18 $\Omega$	14 A	9.0 A	
IRF532	100 V	0.25 $\Omega$	12 A	8.0 A	
IRF533	60 V	0.25 $\Omega$	12 A	8.0 A	
MTP20N08	80 V	0.15 $\Omega$	20 A	11.5 A	
MTP20N10	100 V	0.15 $\Omega$	20 A	11.5 A	

**Notes**

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

**Maximum Ratings**

Symbol	Characteristic	Rating IRF130/132 IRF530/532 MTP20N10	Rating MTP20N08	Rating IRF131/133 IRF531/533	Unit
V <sub>DSS</sub>	Drain to Source Voltage <sup>1</sup>	100	80	60	V
V <sub>DGR</sub>	Drain to Gate Voltage <sup>1</sup> R <sub>GS</sub> = 20 kΩ	100	80	60	V
V <sub>GS</sub>	Gate to Source Voltage	± 20	± 20	± 20	V
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperatures	-55 to +150	-55 to +150	-55 to +150	°C
T <sub>L</sub>	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 <sub>θJC</sub>	Thermal Resistance, Junction to Case	1.67	1.25	°C/W
P <sub>D</sub>	Total Power Dissipation at T <sub>C</sub> = 25°C	75	100	W
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	60	60	A

**Electrical Characteristics** (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
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**Off Characteristics**

V <sub>(BR)DSS</sub>	Drain Source Breakdown Voltage <sup>1</sup> IRF130/132/530/532/ MTP20N10 MTP20N08 IRF131/133/531/533	100		V	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA
		80			
		60			
I <sub>DSS</sub>	Zero Gate Voltage Drain Current		250	μA	V <sub>DS</sub> = Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 V
			1000	μA	V <sub>DS</sub> = 0.8 x Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 V, T <sub>C</sub> = 125°C
I <sub>GSS</sub>	Gate-Body Leakage Current IRF130-133 IRF530-533/ MTP20N08/MTP20N10		± 100	nA	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V
			± 500		

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

Symbol	Characteristic	Min	Max	Unit	Test Conditions
<b>On Characteristics</b>					
$V_{GS(th)}$	Gate Threshold Voltage			V	$I_D = 250 \mu\text{A}, V_{DS} = V_{GS}$ $I_D = 1 \text{ mA}, V_{DS} = V_{GS}$
	IRF130/133/530/533	2.0	4.0		
	MTP20N08/20N10	2.0	4.5		
$R_{DS(on)}$	Static Drain-Source On-Resistance <sup>2</sup>			$\Omega$	$V_{GS} = 10 \text{ V}, I_D = 8.0 \text{ A}$  $I_D = 10 \text{ A}$
	IRF130/131/530/531		0.18		
	IRF132/133/532/533		0.25		
	MTP20N08/20N10		0.15		
$V_{DS(on)}$	Drain-Source On-Voltage <sup>2</sup>		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 ( $\Omega$ )	$V_{DS} = 10 \text{ V}, I_D = 8.0 \text{ A}$
<b>Dynamic Characteristics</b>					
$C_{iss}$	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	
<b>Switching Characteristics</b> ( $T_C = 25^\circ\text{C}$ , Figures 1, 2) <sup>3</sup>					
$t_{d(on)}$	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	$V_{GS} = 10 \text{ V}, I_D = 18 \text{ A}$ $V_{DD} = 80 \text{ V}$

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

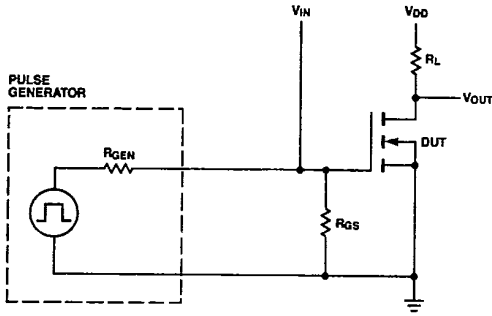
Symbol	Characteristic	Typ	Max	Unit	Test Conditions
<b>Source-Drain Diode Characteristics</b>					
$V_{SD}$	Diode Forward Voltage IRF130/131/530/531	1.5	2.5	V	$I_S = 14\text{ A}; V_{GS} = 0\text{ V}$
	IRF132/133/532/533	1.5	2.3	V	$I_S = 12\text{ A}; V_{GS} = 0\text{ V}$
$t_{rr}$	Reverse Recovery Time	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.

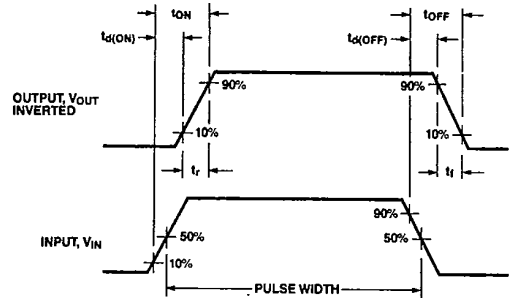
Typical Electrical Characteristics

Figure 1 Switching Test Circuit



CR04450F

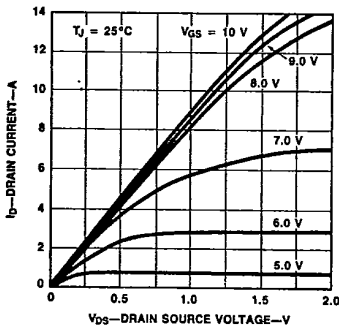
Figure 2 Switching Waveforms



WF00600F

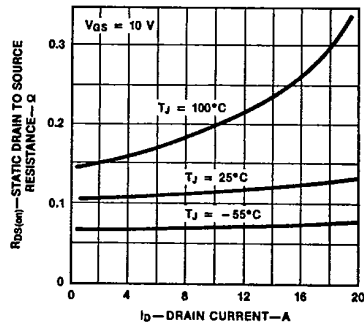
Typical Performance Curves

Figure 3 Output Characteristics



PC09960F

Figure 4 Static Drain to Source Resistance vs Drain Current



PC09970F

Typical Performance Curves (Cont.)

Figure 5 Transfer Characteristics

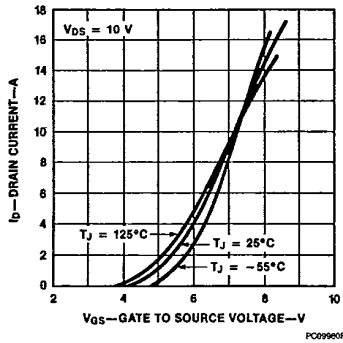


Figure 7 Capacitance vs Drain to Source Voltage

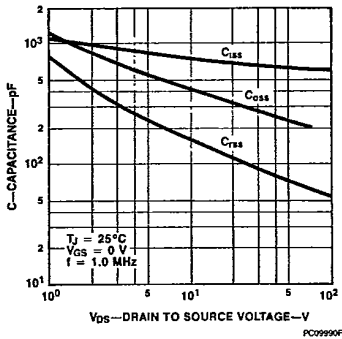


Figure 9 Forward Biased Safe Operating Area for IRF130-133 and IRF530-533

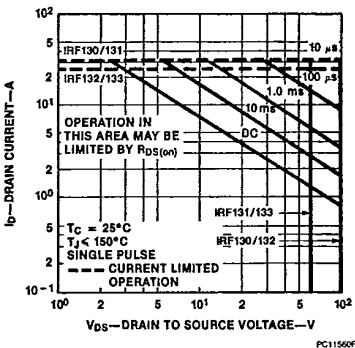


Figure 6 Temperature Variation of Gate to Source Threshold Voltage

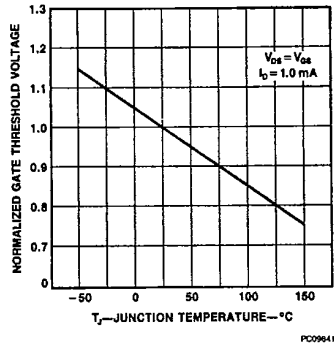


Figure 8 Gate to Source Voltage vs Total Gate Charge

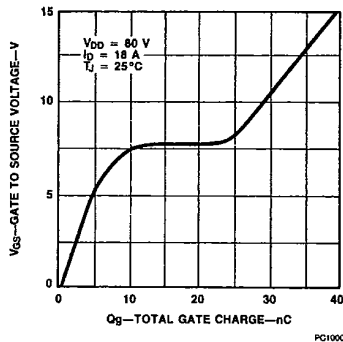
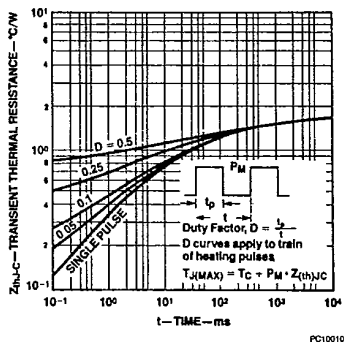
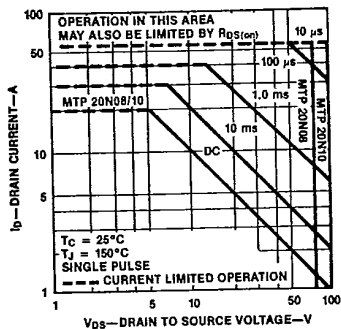


Figure 10 Transient Thermal Resistance vs Time for IRF130-133 and IRF530-533



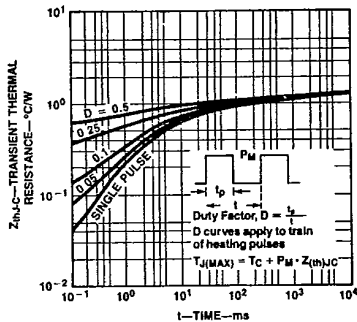
Typical Performance Curves (Cont.)

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



PC10021F

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



PC10030F