

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

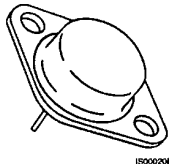
Power And Discrete Division

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.

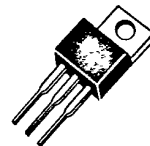
- Low $R_{DS(on)}$
- V_{GS} Rated at ± 20 V
- Silicon Gate for Fast Switching Speeds
- I_{DSS} , $V_{DS(on)}$, Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

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.

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
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Off Characteristics

V _{(BR)DSS}	Drain Source Breakdown Voltage ¹ IRF130/132/530/532/ MTP20N10 MTP20N08 IRF131/133/531/533	100		V	V _{GS} = 0 V, I _D = 250 μA
		80			
		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 x Rated V _{DSS} , V _{GS} = 0 V, T _C = 125°C
I _{GSS}	Gate-Body Leakage Current IRF130-133 IRF530-533/ MTP20N08/MTP20N10		± 100	nA	V _{GS} = ± 20 V, V _{DS} = 0 V
			± 500		

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	$I_D = 250 \mu\text{A}, V_{DS} = V_{GS}$ $I_D = 1 \text{ mA}, V_{DS} = V_{GS}$
	IRF130/133/530/533	2.0	4.0		
	MTP20N08/20N10	2.0	4.5		
$R_{DS(on)}$	Static Drain-Source On-Resistance ²			Ω	$V_{GS} = 10 \text{ V}, I_D = 8.0 \text{ A}$ $I_D = 10 \text{ A}$
	IRF130/131/530/531		0.18		
	IRF132/133/532/533		0.25		
	MTP20N08/20N10		0.15		
$V_{DS(on)}$	Drain-Source On-Voltage 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	$V_{GS} = 10 \text{ V}, I_D = 18 \text{ A}$ $V_{DD} = 80 \text{ V}$

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

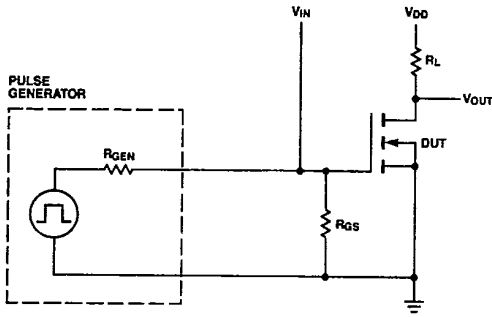
Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V_{SD}	Diode Forward Voltage IRF130/131/530/531	1.5	2.5	V	$I_S = 14\text{ A}; V_{GS} = 0\text{ V}$
	IRF132/133/532/533	1.5	2.3	V	$I_S = 12\text{ A}; V_{GS} = 0\text{ V}$
t_{rr}	Reverse Recovery Time	300		ns	$I_S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

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.

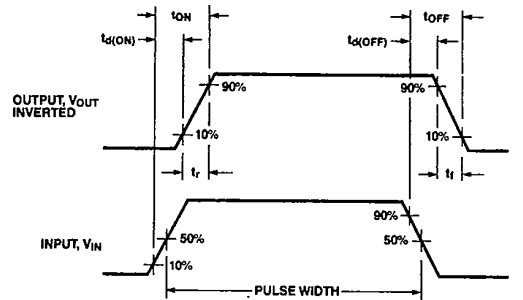
Typical Electrical Characteristics

Figure 1 Switching Test Circuit



CR04450F

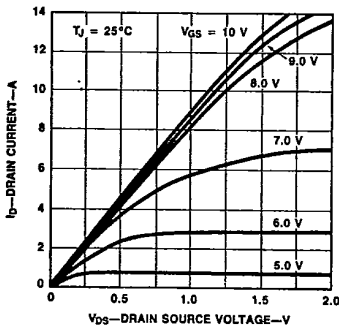
Figure 2 Switching Waveforms



WF00600F

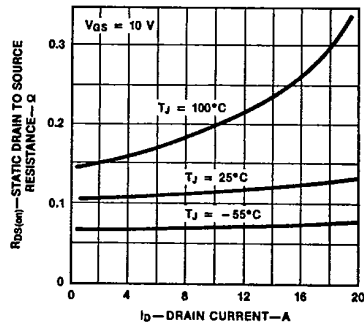
Typical Performance Curves

Figure 3 Output Characteristics



PC09960F

Figure 4 Static Drain to Source Resistance vs Drain Current



PC09970F

Typical Performance Curves (Cont.)

Figure 5 Transfer Characteristics

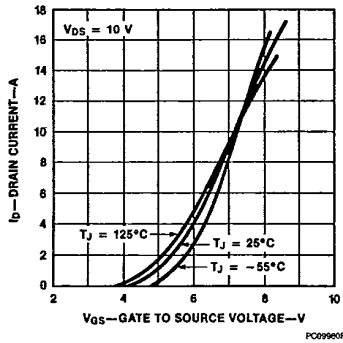


Figure 7 Capacitance vs Drain to Source Voltage

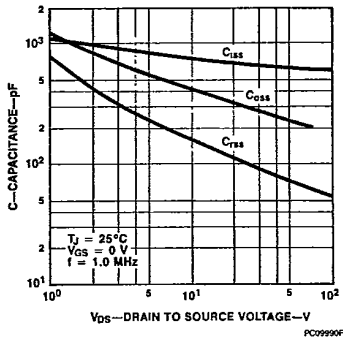


Figure 9 Forward Biased Safe Operating Area for IRF130-133 and IRF530-533

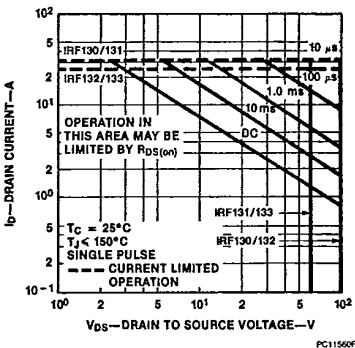


Figure 6 Temperature Variation of Gate to Source Threshold Voltage

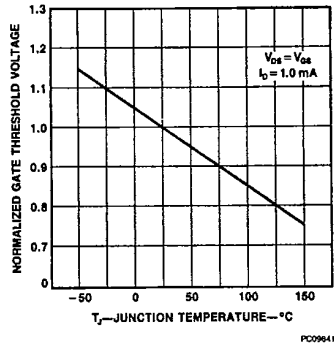


Figure 8 Gate to Source Voltage vs Total Gate Charge

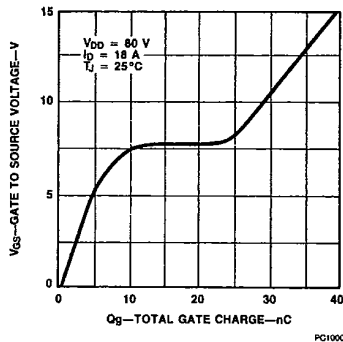
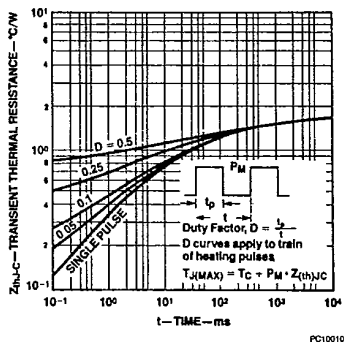
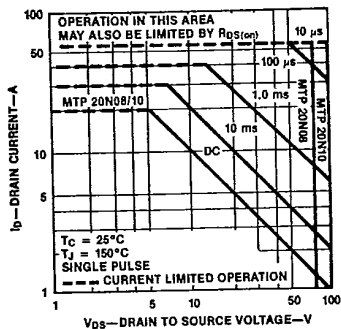


Figure 10 Transient Thermal Resistance vs Time for IRF130-133 and IRF530-533



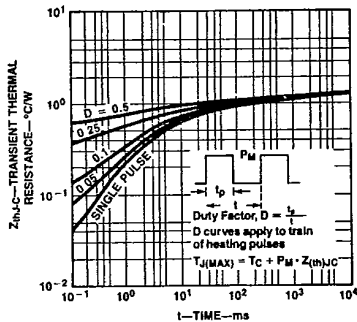
Typical Performance Curves (Cont.)

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



PC10021F

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



PC10030F