

FAIRCHILD

A Schlumberger Company

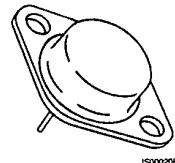
IRF150-153
N-Channel Power MOSFETs,
40 A, 60 V/100 V

Power And Discrete Division T-39-13

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
- $I_{DS(on)}$, SOA Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

TO-204AE

IS00020F

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 IRF150
 IRF151
 IRF152
 IRF153
Maximum Ratings

Symbol	Characteristic	Rating IRF150/152	Rating IRF151/153	Unit
V_{DSS}	Drain to Source Voltage ¹	100	60	V
V_{DGR}	Drain to Gate Voltage ¹ $R_{GS} = 20 \text{ k}\Omega$	100	60	V
V_{GS}	Gate to Source Voltage	± 20	± 20	V
T_J, T_{stg}	Operating Junction and Storage Temperatures	-55 to +150	-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5 s	275	275	°C

Maximum On-State Characteristics

		IRF150/151	IRF152/153	
$R_{DS(on)}$	Static Drain-to-Source On Resistance ²	0.055	0.08	Ω
I_D	Drain Current Continuous Pulsed	40 60	33 132	A

Maximum Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	0.83	°C/W
P_D	Total Power Dissipation at $T_C = 25^\circ\text{C}$	150	150	W

Notes

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

IRF150-153

T-39-13

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

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(\text{BR})\text{DSS}}$	Drain Source Breakdown Voltage ¹			V	$V_{\text{GS}} = 0 \text{ V}, I_D = 250 \mu\text{A}$
	IRF150/152	100			
	IRF151/153	60			
I_{DSS}	Zero Gate Voltage Drain Current		250	μA	$V_{\text{DS}} = \text{Rated } V_{\text{DSS}}, V_{\text{GS}} = 0 \text{ V}$
			1000		
I_{GSS}	Gate-Body Leakage Current		± 100	nA	$V_{\text{GS}} = \pm 20 \text{ V}, V_{\text{DS}} = 0 \text{ V}$
On Characteristics					
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	2.0	4.0	V	$I_D = 250 \mu\text{A}, V_{\text{DS}} = V_{\text{GS}}$
$R_{\text{DS}(\text{on})}$	Static Drain-Source On-Resistance ²			Ω	$V_{\text{GS}} = 10 \text{ V}, I_D = 20 \text{ A}$
			0.055		
			0.08		
g_{fs}	Forward Transconductance	9.0		S (S)	$V_{\text{DS}} = 10 \text{ V}, I_D = 20 \text{ A}$
Dynamic Characteristics					
C_{iss}	Input Capacitance		3000	pF	$V_{\text{DS}} = 25 \text{ V}, V_{\text{GS}} = 0 \text{ V}$ $f = 1.0 \text{ MHz}$
C_{oss}	Output Capacitance		1500	pF	
C_{rss}	Reverse Transfer Capacitance		500	pF	
Switching Characteristics ($T_C = 25^\circ\text{C}$, Figures 9, 10)³					
$t_{\text{d}(\text{on})}$	Turn-On Delay Time		35	ns	$V_{\text{DD}} = 24 \text{ V}, I_D = 20 \text{ A}$ $V_{\text{GS}} = 10 \text{ V}, R_{\text{GEN}} = 4.7 \Omega$ $R_{\text{GS}} = 4.7 \Omega$
t_r	Rise Time		100	ns	
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		125	ns	
t_f	Fall Time		100	ns	
$t_{\text{d}(\text{on})}$	Turn-On Delay Time		75	ns	$V_{\text{DD}} = 75 \text{ V}, I_D = 20 \text{ A}$ $V_{\text{GS}} = 10 \text{ V}, R_{\text{GEN}} = 50 \Omega$ $R_{\text{GS}} = 50 \Omega$
t_r	Rise Time		450	ns	
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		300	ns	
t_f	Fall Time		200	ns	
Q_g	Total Gate Charge		120	nC	$V_{\text{GS}} = 10 \text{ V}, I_D = 50 \text{ A}$ $V_{\text{DD}} = 55 \text{ V}$

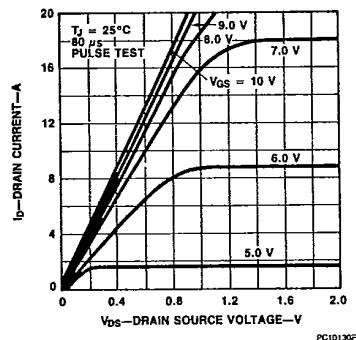
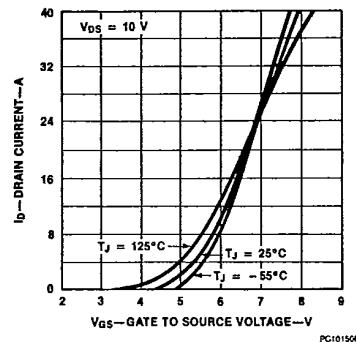
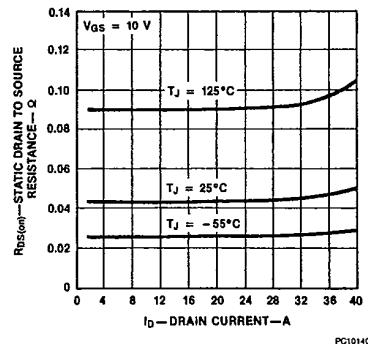
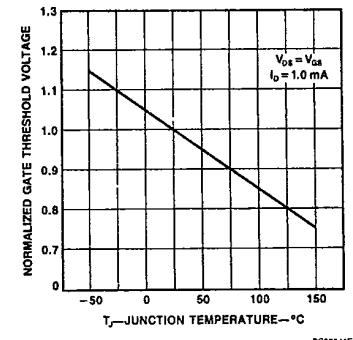
Electrical Characteristics (Cont.) ($T_C = 25^\circ\text{C}$ unless otherwise noted)

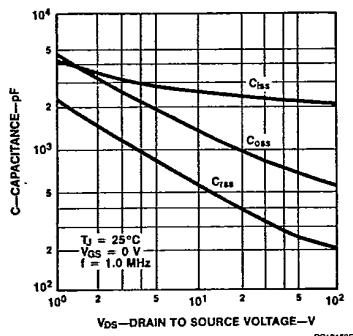
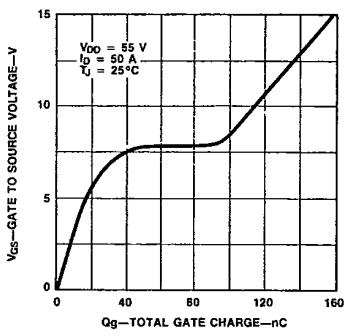
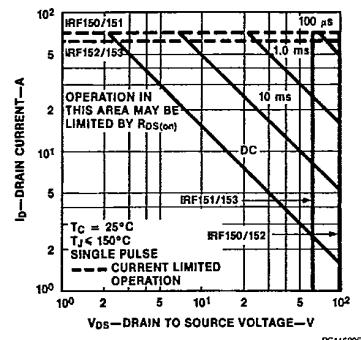
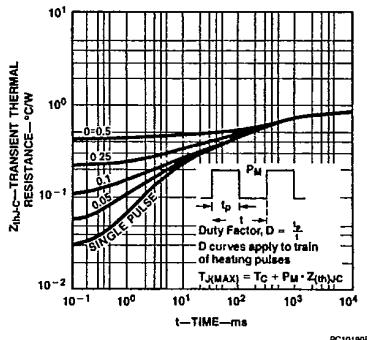
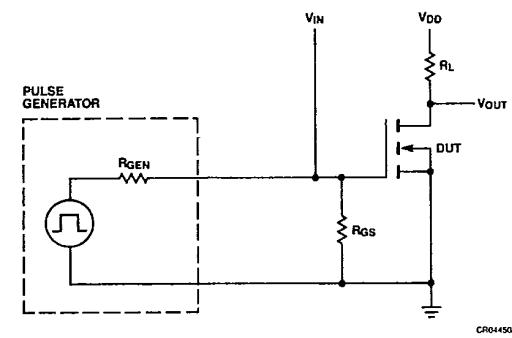
Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V _{SD}	Diode Forward Voltage IRF150/151	2.0	2.5	V	I _S = 40 A; V _{GS} = 0 V
	IRF152/153	2.0	2.3	V	I _S = 33 A; V _{GS} = 0 V
t _{rr}	Reverse Recovery Time	300		ns	I _S = 4 A; dI _S /dt = 25 A/μS

Notes

1. T_J = +25°C to +150°C
2. Pulse test: Pulse width ≤ 80 μs, Duty cycle ≤ 1%
3. Switching time measurements performed on LEM TR-58 test equipment.

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Typical Performance Curves**Figure 1 Output Characteristics****Figure 3 Transfer Characteristics****Figure 2 Static Drain to Source Resistance vs Drain Current****Figure 4 Temperature Variation of Gate to Source Threshold Voltage**

Typical Performance Curves (Cont.)**Figure 5 Capacitance vs Drain to Source Voltage****Figure 6 Gate to Source Voltage vs Total Gate Charge****Figure 7 Forward Biased Safe Operating Area****Figure 8 Transient Thermal Resistance vs Time****Typical Electrical Characteristics****Figure 9 Switching Test Circuit****Figure 10 Switching Waveforms**