FAIRCHILD
A Schlumberger Company

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

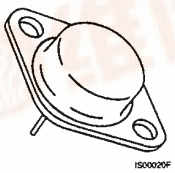
Power And Discrete Division T-39-13

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_{DSS}, SOA Specified at Elevated Temperature**
- **Rugged**
- **Low Drive Requirements**
- **Ease of Paralleling**

TO-204AE



IRF150
IRF151
IRF152
IRF153

2

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 kΩ	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°C	150	150	W

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

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]			V	V_{GS} = 0 V, I_D = 250 μA
	IRF150/152	100			
	IRF151/153	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		±100	nA	V_{GS} = ±20 V, V_{DS} = 0 V
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.0	V	I_D = 250 μA, V_{DS} = V_{GS}
$R_{DS(on)}$	Static Drain-Source On-Resistance[2]			Ω	V_{GS} = 10 V, I_D = 20 A
	IRF150/151		0.055		
	IRF152/153		0.08		
g_{fs}	Forward Transconductance	9.0		S (℧)	V_{DS} = 10 V, I_D = 20 A
Dynamic Characteristics					
C_{iss}	Input Capacitance		3000	pF	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz
C_{oss}	Output Capacitance		1500	pF	
C_{rss}	Reverse Transfer Capacitance		500	pF	
Switching Characteristics (T_C = 25°C, *Figures 9, 10*)[3]					
$t_{d(on)}$	Turn-On Delay Time		35	ns	V_{DD} = 24 V, I_D = 20 A, V_{GS} = 10 V, R_{GEN} = 4.7 Ω, R_{GS} = 4.7 Ω
t_r	Rise Time		100	ns	
$t_{d(off)}$	Turn-Off Delay Time		125	ns	
t_f	Fall Time		100	ns	
$t_{d(on)}$	Turn-On Delay Time		75	ns	V_{DD} = 75 V, I_D = 20 A, V_{GS} = 10 V, R_{GEN} = 50 Ω, R_{GS} = 50 Ω
t_r	Rise Time		450	ns	
$t_{d(off)}$	Turn-Off Delay Time		300	ns	
t_f	Fall Time		200	ns	
Q_g	Total Gate Charge		120	nC	V_{GS} = 10 V, I_D = 50 A, V_{DD} = 55 V

Electrical Characteristics (Cont.) (T_C = 25°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.

Typical Performance Curves

Figure 1 Output Characteristics

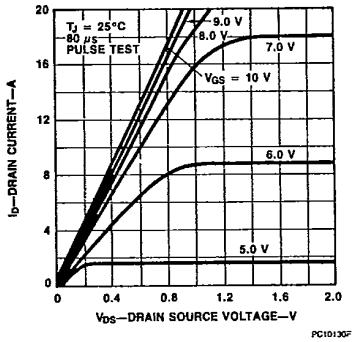


Figure 2 Static Drain to Source Resistance vs Drain Current

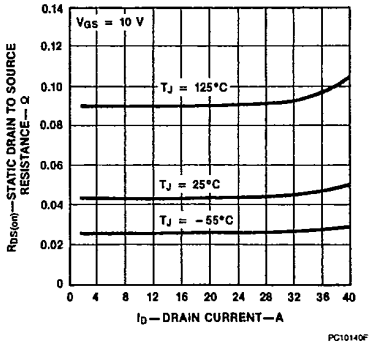


Figure 3 Transfer Characteristics

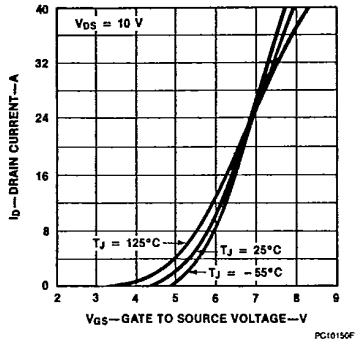
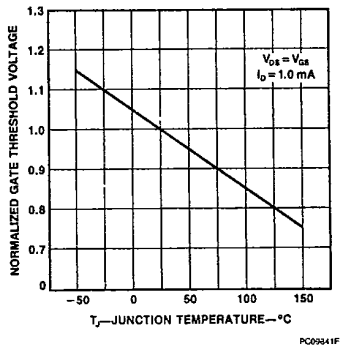


Figure 4 Temperature Variation of Gate to Source Threshold Voltage



Typical Performance Curves (Cont.)

Figure 5 Capacitance vs Drain to Source Voltage

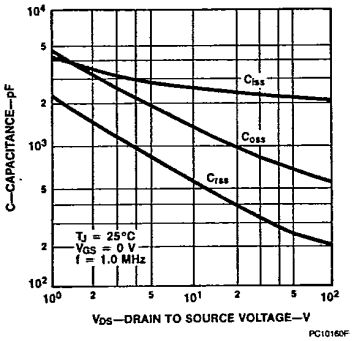


Figure 6 Gate to Source Voltage vs Total Gate Charge

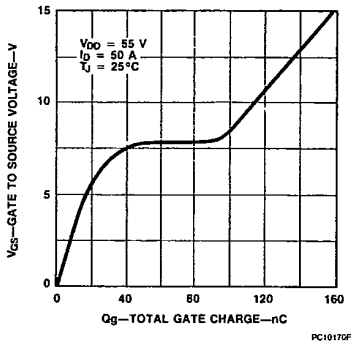


Figure 7 Forward Biased Safe Operating Area

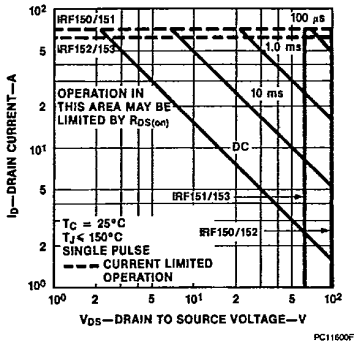
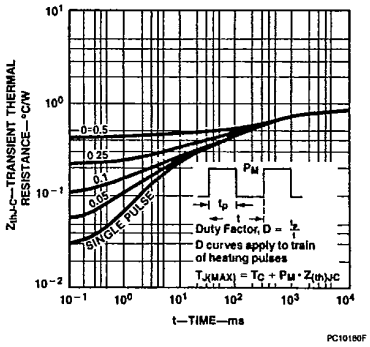


Figure 8 Transient Thermal Resistance vs Time



Typical Electrical Characteristics

Figure 9 Switching Test Circuit

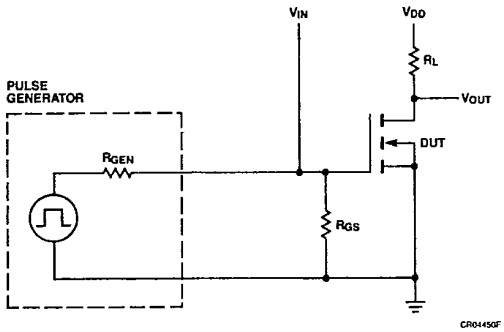


Figure 10 Switching Waveforms