

**FAIRCHILD**

A Schlumberger Company

# IRF150-153

## N-Channel Power MOSFETs,

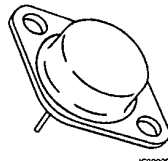
### 40 A, 60 V/100 V

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  $\pm 20$  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

**Maximum Ratings**

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

**Maximum On-State Characteristics**

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

**Maximum Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	0.83	$^{\circ}\text{C/W}$
$P_D$	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.

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

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage <sup>1</sup>			V	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$
	IRF150/152	100			
	IRF151/153	60			
$I_{DSS}$	Zero Gate Voltage Drain Current		250	$\mu\text{A}$	$V_{DS} = \text{Rated } V_{DSS}$ , $V_{GS} = 0\text{ V}$
			1000	$\mu\text{A}$	$V_{DS} = 0.8 \times \text{Rated } V_{DSS}$ , $V_{GS} = 0\text{ V}$ , $T_C = 125^\circ\text{C}$
$I_{GSS}$	Gate-Body Leakage Current		$\pm 100$	nA	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.0	V	$I_D = 250\text{ }\mu\text{A}$ , $V_{DS} = V_{GS}$
$R_{DS(on)}$	Static Drain-Source On-Resistance <sup>2</sup>			$\Omega$	$V_{GS} = 10\text{ V}$ , $I_D = 20\text{ A}$
	IRF150/151		0.055		
	IRF152/153		0.08		
$g_{fs}$	Forward Transconductance	9.0		S ( $\Omega$ )	$V_{DS} = 10\text{ V}$ , $I_D = 20\text{ A}$
Dynamic Characteristics					
$C_{iss}$	Input Capacitance		3000	pF	$V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ $f = 1.0\text{ MHz}$
$C_{oss}$	Output Capacitance		1500	pF	
$C_{rss}$	Reverse Transfer Capacitance		500	pF	
Switching Characteristics ( $T_C = 25^\circ\text{C}$ , Figures 9, 10) <sup>3</sup>					
$t_{d(on)}$	Turn-On Delay Time		35	ns	$V_{DD} = 24\text{ V}$ , $I_D = 20\text{ A}$ $V_{GS} = 10\text{ V}$ , $R_{GEN} = 4.7\text{ }\Omega$ $R_{GS} = 4.7\text{ }\Omega$
$t_r$	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	$V_{DD} = 75\text{ V}$ , $I_D = 20\text{ A}$ $V_{GS} = 10\text{ V}$ , $R_{GEN} = 50\text{ }\Omega$ $R_{GS} = 50\text{ }\Omega$
$t_r$	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	$V_{GS} = 10\text{ V}$ , $I_D = 50\text{ A}$ $V_{DD} = 55\text{ V}$

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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 IRF150/151	2.0	2.5	V	$I_S = 40\text{ A}; V_{GS} = 0\text{ V}$
	IRF152/153	2.0	2.3	V	$I_S = 33\text{ A}; V_{GS} = 0\text{ V}$
$t_{rr}$	Reverse Recovery Time	300		ns	$I_S = 4\text{ A}; dI_S/dt = 25\text{ A}/\mu\text{S}$

## Notes

1.  $T_J = +25^\circ\text{C}$  to  $+150^\circ\text{C}$
2. Pulse test: Pulse width  $\leq 80\text{ }\mu\text{s}$ , Duty cycle  $\leq 1\%$
3. Switching time measurements performed on LEM TR-58 test equipment.

## Typical Performance Curves

Figure 1 Output Characteristics

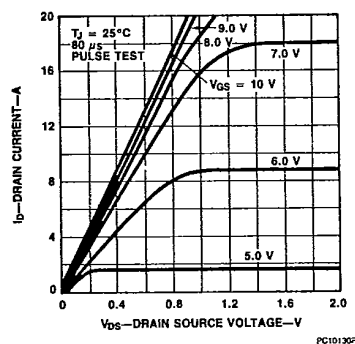


Figure 2 Static Drain to Source Resistance vs Drain Current

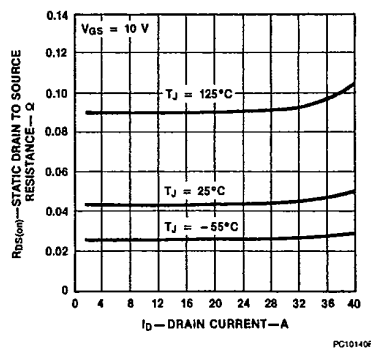


Figure 3 Transfer Characteristics

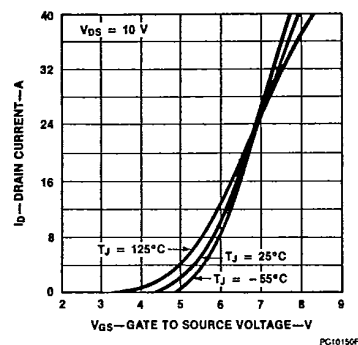
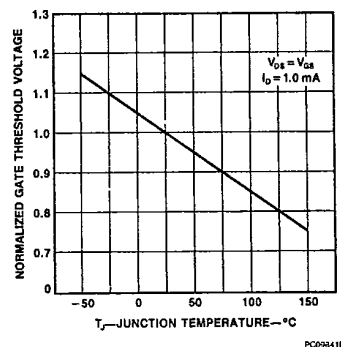


Figure 4 Temperature Variation of Gate to Source Threshold Voltage



## Typical Performance Curves (Cont.)

Figure 5 Capacitance vs Drain to Source Voltage

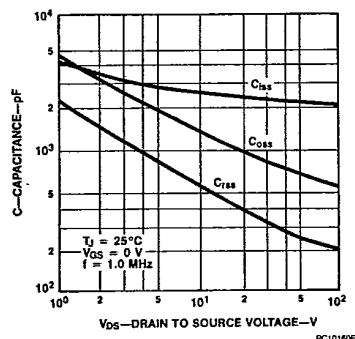
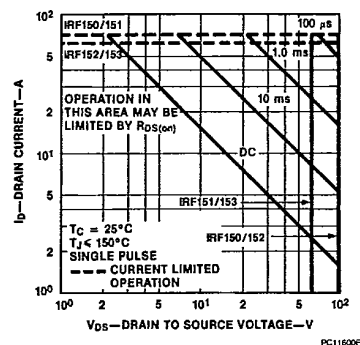


Figure 7 Forward Biased Safe Operating Area



## Typical Electrical Characteristics

Figure 9 Switching Test Circuit

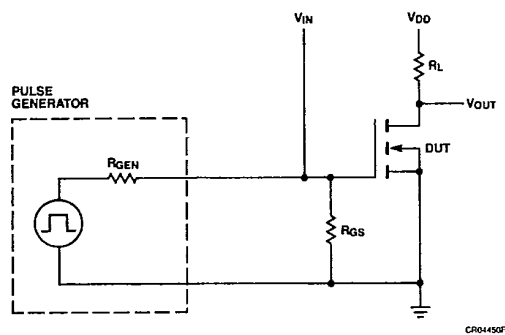


Figure 6 Gate to Source Voltage vs Total Gate Charge

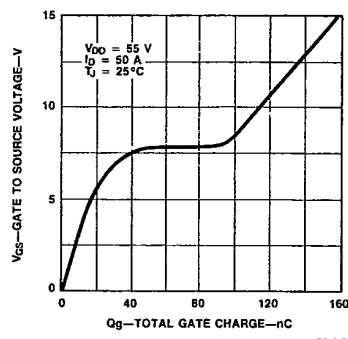


Figure 8 Transient Thermal Resistance vs Time

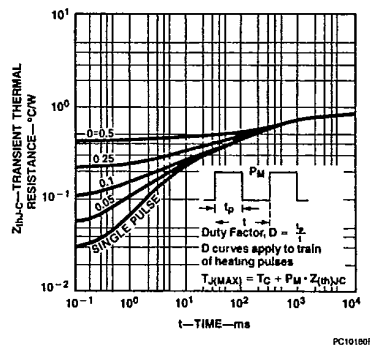


Figure 10 Switching Waveforms

