

**FAIRCHILD**

A Schlumberger Company

**IRF340-343/IRF740-743 T-39-13**  
**MTM8N35/8N40**  
**N-Channel Power MOSFETs,**  
**10 A, 350 V/400 V**

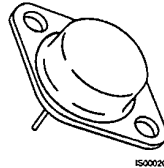
Power And Discrete Division

**Description**

These devices are n-channel, enhancement mode, power MOSFETs designed especially for high voltage, high speed applications, such as off-line switching power supplies, UPS, AC and DC motor controls, relay and solenoid drivers.

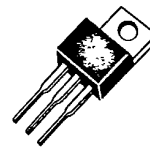
- $V_{GS}$  Rated at  $\pm 20$  V
- Silicon Gate for Fast Switching Speeds
- $I_{DSS}$ ,  $V_{DS(on)}$ , SOA and  $V_{GS(th)}$  Specified at Elevated Temperature
- Rugged

TO-204AA



IRF340  
 IRF341  
 IRF342  
 IRF343  
 MTM8N35  
 MTM8N40

TO-220AB



IRF740  
 IRF741  
 IRF742  
 IRF743

**Maximum Ratings**

Symbol	Characteristic	Rating IRF340/342 IRF740/742 MTM8N40	Rating IRF341/343 IRF741/743 MTM8N35	Unit
$V_{DSS}$	Drain to Source Voltage	400	350	V
$V_{DGR}$	Drain to Gate Voltage $R_{GS} = 1.0 \text{ M}\Omega$	400	350	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	$\pm 20$	V
$T_J, T_{stg}$	Operating Junction Temperature Storage Temperature	-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**

		IRF340/341 IRF740/741	IRF342/343 IRF742/743	MTM8N35 MTM8N40	
$R_{DS(on)}$	Static Drain-to-Source On Resistance	0.55	0.80	0.55	$\Omega$
$I_D$	Drain Current Continuous Pulsed	10 40	8 32	8 48	A

**Maximum Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.0	1.0	0.83	$^{\circ}\text{C}/\text{W}$
$P_D$	Total Power Dissipation at $T_C = 25^{\circ}\text{C}$	125	125	150	W

**Notes**

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

IRF340-343/IRF740-743

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

Symbol	Characteristic	Min	Max	Unit	Test Conditions
<b>Off Characteristics</b>					
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage <sup>1</sup> IRF340/342/740/742 IRF341/343/741/743			V	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$
		400			
		350			
$I_{DSS}$	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 IRF340-343 IRF740-743		$\pm 100$ $\pm 500$	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	$I_D = 250\ \mu\text{A}, V_{DS} = V_{GS}$
$R_{DS(on)}$	Static Drain-Source On-Resistance <sup>2</sup> IRF340/341/740/741 IRF342/343/742/743			$\Omega$	$V_{GS} = 10\text{ V}, I_D = 5.0\text{ A}$
			0.55		
			0.80		
$g_{fs}$	Forward Transconductance	4.0		S ( $\Omega$ )	$V_{DS} = 10\text{ V}, I_D = 5.0\text{ A}$

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance		1600	pF	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$ $f = 1.0\text{ MHz}$
$C_{oss}$	Output Capacitance		450	pF	
$C_{rss}$	Reverse Transfer Capacitance		150	pF	

**Switching Characteristics** ( $T_C = 25^\circ\text{C}$ , Figures 9, 10)

$t_{d(on)}$	Turn-On Delay Time		35	ns	$V_{DD} = 175\text{ V}, I_D = 5.0\text{ A}$ $V_{GS} = 10\text{ V}, R_{GEN} = 4.7\ \Omega$ $R_{GS} = 4.7\ \Omega$
$t_r$	Rise Time		15	ns	
$t_{d(off)}$	Turn-Off Delay Time		90	ns	
$t_f$	Fall Time		35	ns	
$Q_g$	Total Gate Charge		60	nC	$V_{GS} = 10\text{ V}, I_D = 12\text{ A}$ $V_{DD} = 400\text{ V}$

Symbol	Characteristic	Typ	Max	Unit	Test Conditions
<b>Source-Drain Diode Characteristics</b>					
$V_{SD}$	Diode Forward Voltage IRF340/341/740/741 IRF342/343/742/743		2.0	V	$I_S = 10\text{ A}; V_{GS} = 0\text{ V}$ $I_S = 8\text{ A}; V_{GS} = 0\text{ V}$
			1.9	V	
$t_{rr}$	Reverse Recovery Time	600		ns	$I_S = 10\text{ A}; dI_S/dt = 100\text{ A}/\mu\text{S}$

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

Symbol	Characteristic	Min	Max	Unit	Test Conditions
<b>Off Characteristics</b>					
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage <sup>1</sup>			V	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 5.0 mA
	MTM8N40	400			
	MTM8N35	350			
I <sub>DSS</sub>	Zero Gate Voltage Drain Current		0.25	mA	V <sub>DS</sub> = 0.85 x Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 V
			2.5	mA	V <sub>DS</sub> = 0.85 x Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 V, T <sub>C</sub> = 100°C
I <sub>GSS</sub>	Gate-Body Leakage Current		± 500	nA	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V

On Characteristics

V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	4.5	V	I <sub>D</sub> = 1.0 mA, V <sub>DS</sub> = V <sub>GS</sub>
		1.5	4.0	V	I <sub>D</sub> = 1.0 mA, V <sub>DS</sub> = V <sub>GS</sub> T <sub>C</sub> = 100°C
V <sub>DS(on)</sub>	Drain-Source On-Voltage <sup>2</sup>		2.2	V	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 4.0 A
			5.3	V	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 8.0 A
			4.4	V	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.0 A T <sub>C</sub> = 100°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup>		0.55	Ω	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.0 A
g <sub>fs</sub>	Forward Transconductance	3.0		S (Ω)	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 4.0 A

Dynamic Characteristics

C <sub>iss</sub>	Input Capacitance		1800	pF	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V f = 1.0 MHz
C <sub>oss</sub>	Output Capacitance		350	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		150	pF	

Switching Characteristics (T<sub>C</sub> = 25°C, Figures 9, 10)<sup>3</sup>

t <sub>d(on)</sub>	Turn-On Delay Time		60	ns	V <sub>DD</sub> = 25 V, I <sub>D</sub> = 4.0 A V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 50 Ω R <sub>GS</sub> = 50 Ω
t <sub>r</sub>	Rise Time		150	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time		200	ns	
t <sub>f</sub>	Fall Time		120	ns	
Q <sub>g</sub>	Total Gate Charge		60	nC	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A V <sub>DD</sub> = 400 V

Notes

- T<sub>J</sub> = +25°C to +150°C
- Pulse test: Pulse width ≤ 80 μs, Duty cycle ≤ 1%
- Switching time measurements performed on LEM TR-58 test equipment.

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Typical Performance Curves

Figure 1 Output Characteristics

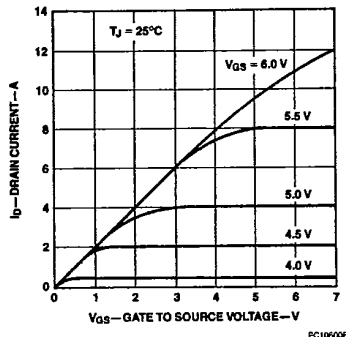


Figure 2 Static Drain to Source Resistance vs Drain Current

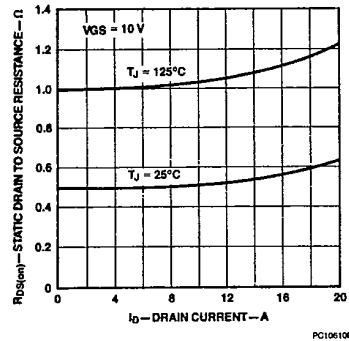


Figure 3 Transfer Characteristics

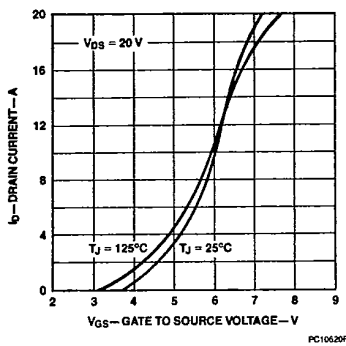


Figure 4 Temperature Variation of Gate to Source Threshold Voltage

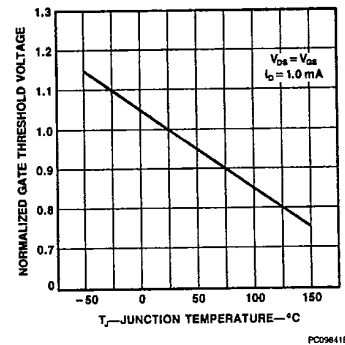


Figure 5 Capacitance vs Drain to Source Voltage

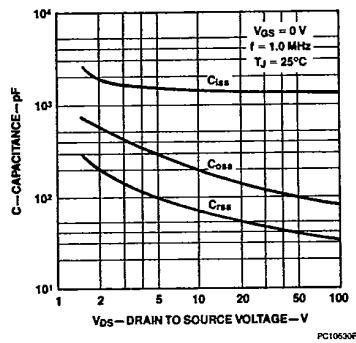
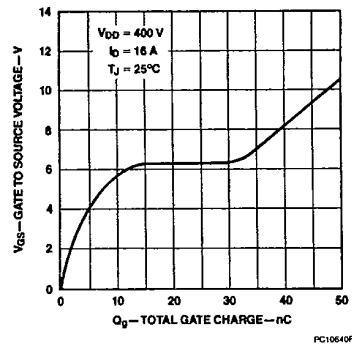


Figure 6 Gate to Source Voltage vs Total Gate Charge



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Typical Performance Curves (Cont.)

Figure 7 Forward Biased Safe Operating Area

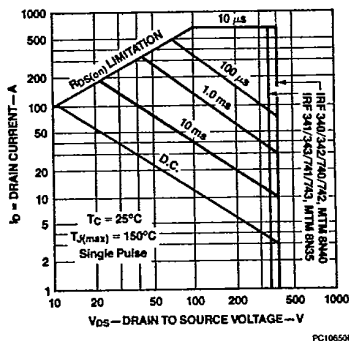
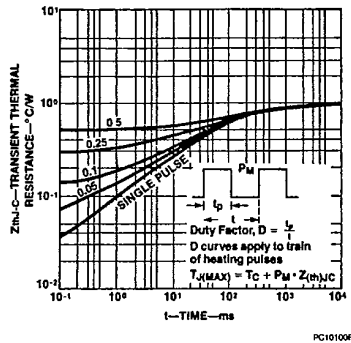


Figure 8 Transient Thermal Resistance vs Time



Typical Electrical Characteristics

Figure 9 Switching Test Circuit

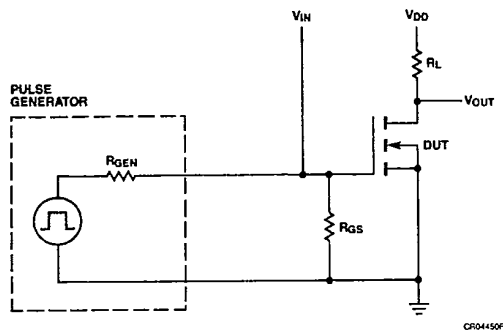


Figure 10 Switching Waveforms

