



**IRF350-353**  
**N-channel Power MOSFETs,**  
**15 A, 350 V/400 V**

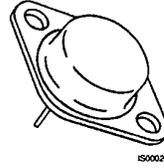
T-39-13

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.

TO-204AA



- V<sub>GS</sub> Rated at ± 20 V
- Silicon Gate for Fast Switching Speeds
- I<sub>DSS</sub>, V<sub>DS(on)</sub>, SOA and V<sub>GS(th)</sub> Specified at Elevated Temperature
- Rugged

IRF350  
 IRF351  
 IRF352  
 IRF353

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**Maximum Ratings**

Symbol	Characteristic	Rating IRF350/352	Rating IRF351/353	Unit
V <sub>DSS</sub>	Drain to Source Voltage	400	350	V
V <sub>DGR</sub>	Drain to Gate Voltage R <sub>GS</sub> = 1.0 MΩ	400	350	V
V <sub>GS</sub>	Gate to Source Voltage	± 20	± 20	V
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperatures	-55 to +150	-55 to +150	°C
T <sub>L</sub>	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5 s	275	275	°C

Data Sheet Technology

**Maximum On-State Characteristics**

		IRF350/351	IRF352/353	
R <sub>DS(on)</sub>	Static Drain-to-Source On Resistance	0.3	0.4	Ω
I <sub>D</sub>	Drain Current			A
	Continuous	15	13	
	Pulsed	60	52	

**Maximum Thermal Characteristics**

R <sub>θJC</sub>	Thermal Resistance, Junction to Case	0.83	0.83	°C/W
P <sub>D</sub>	Total Power Dissipation at T <sub>C</sub> = 25°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
<b>Off Characteristics</b>					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage <sup>1</sup>			V	$V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$
	IRF350/352	400			
	IRF351/353	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		$\pm 100$	nA	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$
<b>On Characteristics</b>					
$V_{GS(th)}$	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>			$\Omega$	$V_{GS} = 10\text{ V}$ , $I_D = 8.0\text{ A}$
	IRF350/351		0.3		
	IRF352/353		0.4		
$g_{fs}$	Forward Transconductance	8.0		S ( $\Omega$ )	$V_{DS} = 10\text{ V}$ , $I_D = 8.0\text{ A}$
<b>Dynamic Characteristics</b>					
$C_{iss}$	Input Capacitance		3000	pF	$V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ $f = 1.0\text{ MHz}$
$C_{oss}$	Output Capacitance		600	pF	
$C_{rss}$	Reverse Transfer Capacitance		200	pF	
<b>Switching Characteristics (<math>T_C = 25^\circ\text{C}</math>, Figures 9, 10)</b>					
$t_{d(on)}$	Turn-On Delay Time		35	ns	$V_{DD} = 180\text{ V}$ , $I_D = 8.0\text{ A}$ $V_{GS} = 10\text{ V}$ , $R_{GEN} = 4.7\ \Omega$ $R_{GS} = 4.7\ \Omega$
$t_r$	Rise Time		65	ns	
$t_{d(off)}$	Turn-Off Delay Time		150	ns	
$t_f$	Fall Time		75	ns	
$Q_g$	Total Gate Charge		120	nC	$V_{GS} = 10\text{ V}$ , $I_D = 16\text{ A}$ $V_{DD} = 400\text{ V}$
<b>Symbol Characteristic Typ Max Unit Test Conditions</b>					
<b>Source-Drain Diode Characteristics</b>					
$V_{SD}$	Diode Forward Voltage			V	$I_S = 15\text{ A}$ ; $V_{GS} = 0\text{ V}$
	IRF350/351		1.6	V	
	IRF352/353		1.5	V	$I_S = 13\text{ A}$ ; $V_{GS} = 0\text{ V}$
$t_{rr}$	Reverse Recovery Time	600		ns	$I_S = 15\text{ A}$ ; $di_S/dt = 100\text{ A}/\mu\text{S}$

## Notes

- $T_J = +25^\circ\text{C}$  to  $+150^\circ\text{C}$
- Pulse test: Pulse width  $\leq 80\ \mu\text{s}$ , Duty cycle  $\leq 1\%$

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Typical Performance Curves

Figure 1 Output Characteristics

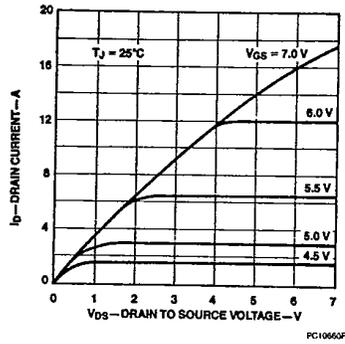


Figure 2 Static Drain to Source On Resistance vs Drain Current

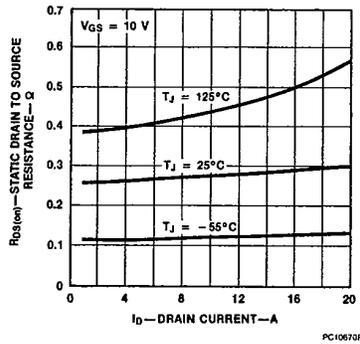


Figure 3 Transfer Characteristics

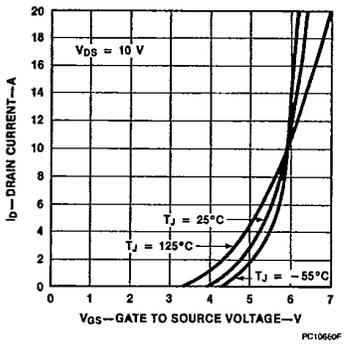


Figure 4 Temperature Variation of Gate to Source Threshold Voltage

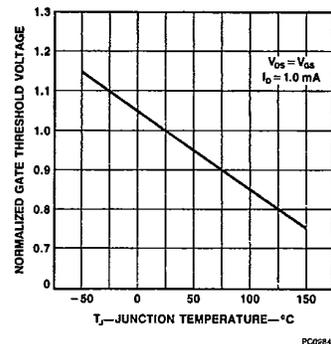


Figure 5 Capacitance vs Drain to Source Voltage

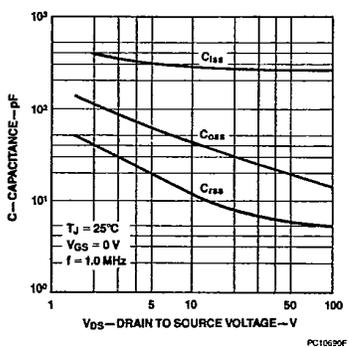
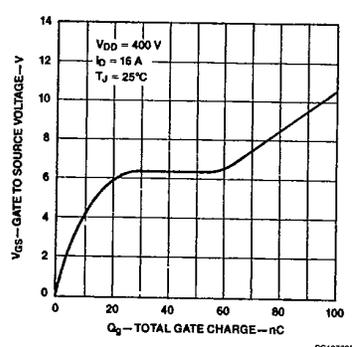


Figure 6 Gate to Source Voltage vs Total Gate Charge



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Typical Performance Curves (Cont.)

Figure 7 Forward Biased Safe Operating Area

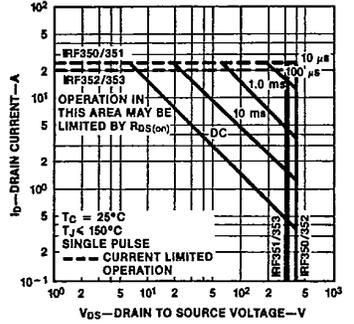
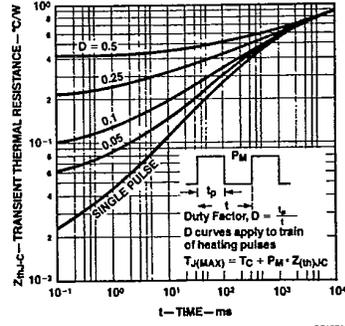


Figure 8 Transient Thermal Resistance vs Time



Typical Electrical Characteristics

Figure 9 Switching Test Circuit

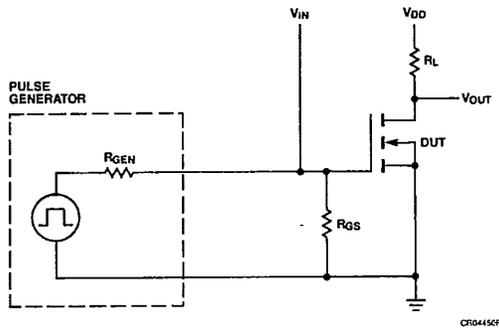


Figure 10 Switching Waveforms

