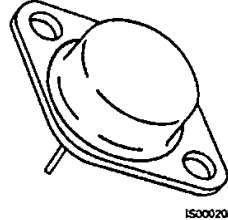


**Description**

These device are n-channel, enhancement mode, power MOSFETs designed especially for high speed applications, such as switching power supplies, converters, AC and DC motor controls, relay and solenoid drivers and other pulse circuits.

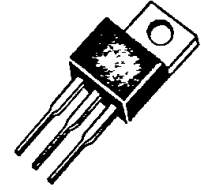
- Low  $R_{DS(on)}$
- $V_{GS}$  Rated at  $\pm 20V$
- Silicon Gate for Fast Switching Speeds
- $I_{DSS}$ ,  $V_{DS(on)}$ , Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

**TO-204AA**



IRF220  
 IRF221  
 IRF222  
 IRF223

**TO-220AB**



IRF620  
 IRF622  
 IRF623  
 MTP7N18  
 MTP7N20

**Product Summary**

Part Number	$V_{DSS}$	$R_{DSS(on)}$	$I_D$ at $T_c=25$	$I_D$ at $T_c=100$	Case Style
IRF220	200V	0.8 $\Omega$	5.0A	3.0A	TP-204AA
IRF221	150V	0.8 $\Omega$	5.0A	3.0A	
IRF222	200V	1.2 $\Omega$	4.0A	2.5A	
IRF223	150V	1.2 $\Omega$	4.0A	2.5A	
IRF620	200V	0.8 $\Omega$	5.0A	3.0A	TO-220AB
IRF621	150V	0.8 $\Omega$	5.0A	3.0A	
IRF622	200V	1.2 $\Omega$	4.0A	2.5A	
IRF623	150V	1.2 $\Omega$	4.0A	2.5A	
MTP7N18	180V	0.7 $\Omega$	7.0A	4.5A	
MTP7N20	200V	0.7 $\Omega$	7.0A	4.5A	

**Notes**

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



**IRL220-223/IRF620-623**  
**MTP7N18/7N20**  
**N-Channel Power Mosfets**  
**7A,150-200V**

**Maximum Ratings**

Symbol	Characteristic	Rating IRF220/222 IRF620/622 MTP7N20	Rating MTP7N18	Rating IRF222/223 IRF622/623	Unit
V <sub>DSS</sub>	Drain to Source Voltage <sup>1</sup>	200	180	150	V
V <sub>DGR</sub>	Drain to Gate Voltage <sup>1</sup> R <sub>GS</sub> =20k Ω	200	180	150	V
V <sub>GS</sub>	Gate to Source Voltage	±20	±20	±20	V
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature	-55 to +150	-55 to +150	-55 to +150	
T <sub>L</sub>	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5S	275	275	275	

**Maximum Thermal characteristics**

		IRF220-223/irf620-623	MTP7N/20	
R <sub>θJC</sub>	Thermal Resistance Junction to Case	3.12	1.67	/W
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient	30/80	80	/W
P <sub>D</sub>	Total Power Dissipation at T <sub>C</sub> =25	40	75	W
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	20	20	A

**Electrical Characteristics** (T<sub>C</sub>=25 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> IRF220/222/620/622/ MTP7N20 MTP7N18 IRF221/223/621/623	200		V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
		180			
		150			
I <sub>DSS</sub>	Zero Gate Voltage Drain Current		250	μA	V <sub>DS</sub> =Rated V <sub>DSS</sub> , V <sub>GS</sub> =0V
			1000	μA	V <sub>DS</sub> =0.8xRated V <sub>DSS</sub> , V <sub>GS</sub> =0V, T <sub>C</sub> =125
I <sub>GSS</sub>	Gate-Body Leakage Current IRF220-223 IRF620-623/MTP7N18/20		±100 ±500	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V



**IRL220-223/IRF620-623**  
**MTP7N18/7N20**  
**N-Channel Power Mosfets**  
**7A,150-200V**

**Electrical Characteristics (Cont.) (TC=25 unless otherwise noted)**

Symbol	Characteristic	Min	Max	Unit	Test Conditions
<b>On Characteristics</b>					
V <sub>GS(th)</sub>	Gate Threshold Voltage IRF220-223/IRF620-623 MTP7N18/20	2.0	4.0	V	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =1mA, V <sub>DS</sub> =V <sub>GS</sub>
		2.0	4.5		
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup> IRF220/221/620/621 IRF222/223/622/623 MPT7N18/7N20		0.8	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A  I <sub>D</sub> =3.5A
			1.2		
			0.7		
V <sub>DS(on)</sub>	Drain-Source On-Voltage 2 MTP7N18/7N20		2.45	V	V <sub>GS</sub> =10V; I <sub>D</sub> =3.5A
			5.9	V	V <sub>GS</sub> =10V; I <sub>D</sub> =7.0A
			5.0	V	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A T <sub>C</sub> =100
g <sub>fs</sub>	Forward Transconductance	1.3		S(Ω)	V <sub>DS</sub> =10V, I <sub>D</sub> =2.5A
<b>Dynamic Characteristics</b>					
C <sub>iss</sub>	Input Capacitance		600	pF	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V f=1.0MHz
C <sub>oss</sub>	Output Capacitance		300	pF	
Cr <sub>ss</sub>	Reverse Transfer Capacitance		80	pF	
<b>Switching Characteristics (T<sub>C</sub>=25, Figure 1,2)<sup>3</sup></b>					
t <sub>d(on)</sub>	Turn-on Delay Time		40	ns	V <sub>DD</sub> =100V, I <sub>D</sub> =2.5A V <sub>GS</sub> =10V, R <sub>GEN</sub> =50 Ω R <sub>GS</sub> =50 Ω
t <sub>r</sub>	Rise Time		60	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time		100	ns	
t <sub>f</sub>	Fall Time		60	ns	
Q <sub>g</sub>	Total Gate Charge		15	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A V <sub>DD</sub> =45V
<b>Symbol Characteristic Typ Max Unit Test Conditions</b>					
<b>Source-Drain Diode Characteristics</b>					
V <sub>SD</sub>	Diode Forward Voltage		1.8	V	I <sub>S</sub> =5.0A; V <sub>GS</sub> =0V
			1.4	V	I <sub>S</sub> =4.0A; V <sub>GS</sub> =0V
t <sub>rf</sub>	Reverse Recovery Time	350		ns	I <sub>S</sub> =5.0A; dI <sub>S</sub> /dt=25A/μS

**Notes**

1. T<sub>J</sub>=+25 to +150
2. Pulse width limited by T<sub>J</sub>
3. Switching time measurements performed on LEM TR-58 test equipment.

Typical Electrical Characteristics

Figure 1 Switching Test Circuit

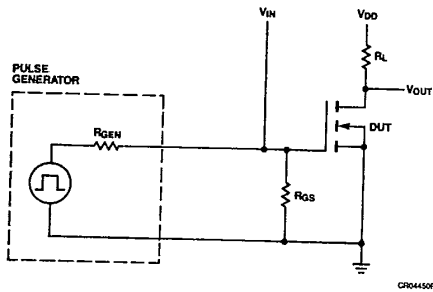
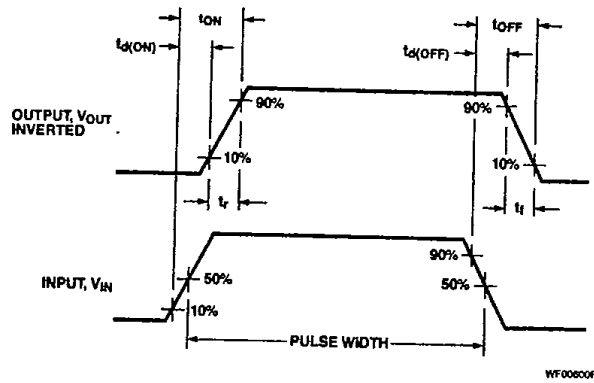


Figure 2 Switching Waveforms



Typical Performance Curves

Figure 3 Output Characteristics

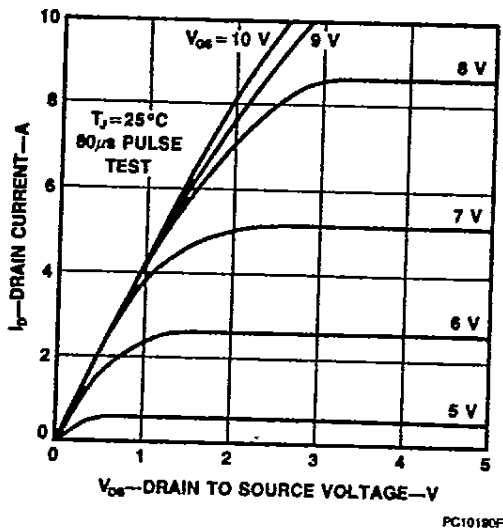


Figure 4 Static Drain to Source Resistance Vs Drain Current

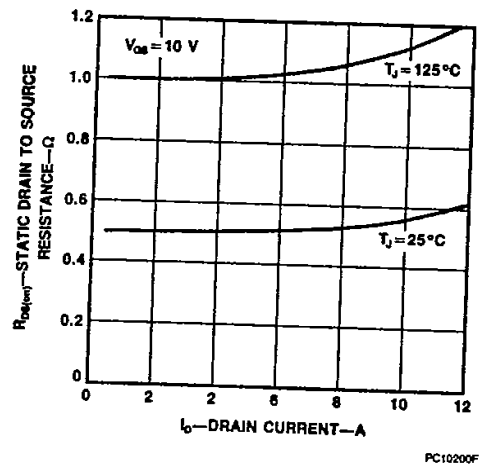


Figure 5 Transfer Characteristics

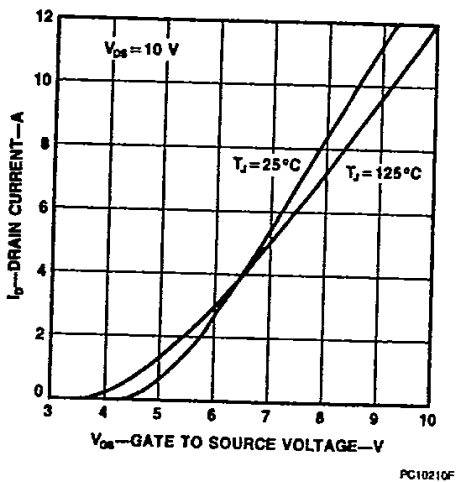
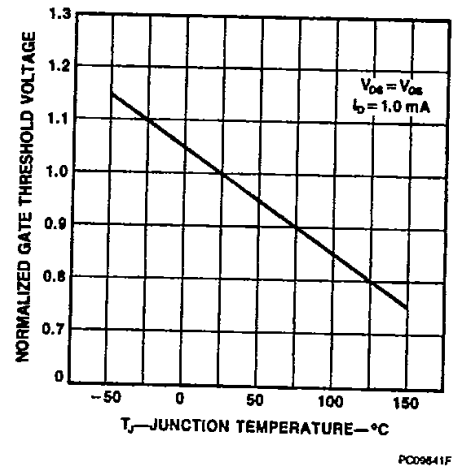
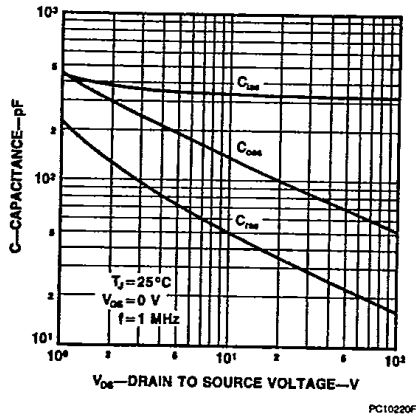


Figure 6 Temperature Variation of Gate to Source Threshold Voltage



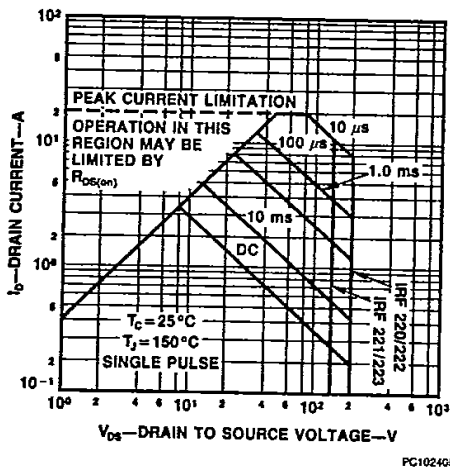
Typical Performance Curves (Cont)

Figure 7 Capacitance vs Drain to Source Voltage



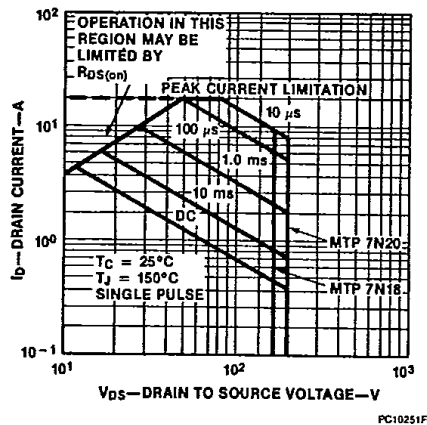
PC10220F

Figure 9 Forward Biased Safe Operating Area for IRF220-223 and IRF620-630



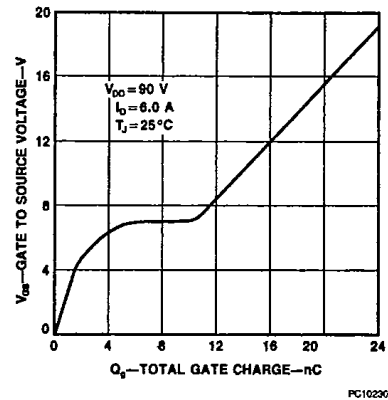
PC10240F

Figure 11 Forward Biased Safe Operating Area for MTP7N18/7N20



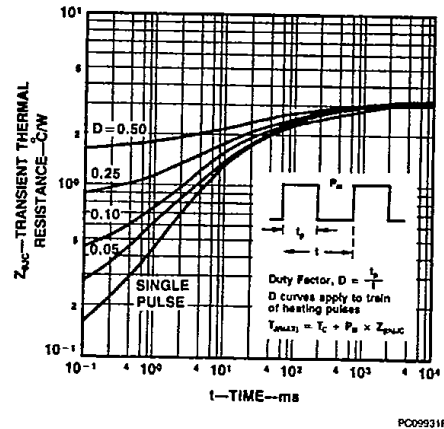
PC10251F

Figure 8 Gate to Source Voltage vs Total Gate Charge



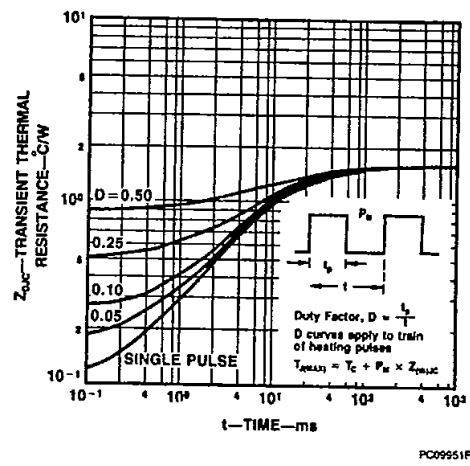
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Figure 10 Transient Thermal Resistance vs Time For IRF220-223 and IRF620-623



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Figure 12 Transient Thermal Resistance vs Time for MTP7n18/7N20



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