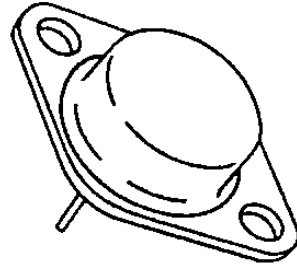


Description

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.

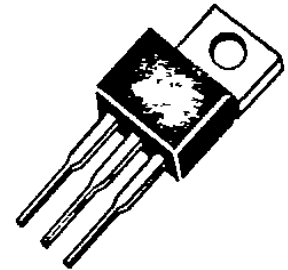
- Low $R_{DS(on)}$
- V_{GS} Rated at $\pm 20V$
- Silicon Gate for Fast Switching Speeds
- I_{DSS} , $V_{DS(on)}$, Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

TO-204AA



IS00020F

TO-220AB



IS00010F

IRF230
 IRF231
 IRF232
 IRF233

IRF630
 IRF631
 IRF632
 IRF633
 MTP12N18
 MTP12N20

Product Summary

Part Number	V_{DSS}	$R_{DS(on)}$	I_D at $T_c=25$	I_D at $T_c=100$	Case Style
IRF230	200V	0.40 Ω	9.0A	6.0A	TO-204AA
IRF231	150V	0.40 Ω	9.0A	6.0A	
IRF232	200V	0.50 Ω	8.0A	5.0A	
IRF233	150V	0.50 Ω	8.0A	5.0A	
IRF630	200V	0.40 Ω	9.0A	6.0A	TO-220AB
IRF631	150V	0.40 Ω	9.0A	6.0A	
IRF632	200V	0.50 Ω	8.0A	5.0A	
IRF633	150V	0.50 Ω	8.0A	5.0A	
MTP12N18	180V	0.35 Ω	12A	8.5A	
MTP12N20	200V	0.35 Ω	12A	8.5A	

Notes

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



Maximum Ratings

Symbol	Characteristic	Rating IRF220/222 IRF620/622 MTP7N20	Rating MTP7N18	Rating IRF222/223 IRF622/623	Unit
V _{DSS}	Drain to Source Voltage 1	200	180	150	V
V _{DGR}	Drain to Gate Voltage1 RGS=20k Ω	200	180	150	V
V _{GS}	Gate to Source Voltage	±20	±20	±20	V
T _J , T _{stg}	Operating Junction and Storage Temperature	-55 to +150	-55 to +150	-50 to +150	
T _L	Maximum Lead Temperatures for Soldering Purposes, 1/8" From Case for 5S	275	275	275	

Maximum Thermal Characteristics

		IRF220-233 IRF630-633	MTP12N18/20	
R _{θJC}	Thermal Resistance Junction to Case	1.67	1.25	/W
P _D	Total Power Dissipation At Tc=25	75	100	W
I _{DM}	Pulsed Drain Current ²	40	40	A

Electrical Characteristics (Tc=25 unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
V _{(BR)DSS}	Drain Source Breakdown Voltage IRF230/232/630/632 MTP12N20 MTP12N18 IRF231/233/631/633	200		V	V _{GS} =0V, I _D =250μA
		180			
		150			
I _{DSS}	Zero Gate Voltage Drain Current		250	μA	V _{DS} =Rated V _{DSS} , V _{GS} =0V
			1000	μA	V _{DS} =0.8 x Rated V _{DSS} , V _{GS} =0V, Tc=125
I _{GSS}	Gate-Body Leakage Current IRF230-233 IRF630-633/ MTP12N18/12N20			nA	V _{GS} =±20V, V _{DS} =0V
			±100		
			±500		



IRF230-233/IRF630-633
MTP12N18/12N20
N-Channel Power Mosfets
12A, 150-200V

Electrical Characteristics (Cont.) (Tc=25 unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
On Characteristics					
V _{GS(th)}	Gate Threshold Voltage IRF230/233/630/633 MTP12N18/12N20	2.0	4.0	V	I _D =250μA, V _{DS} =V _{GS} I _D =1mA, V _{DS} =V _{GS}
		2.0	4.5		
R _{DS(on)}	Static Drain-Source On-Resistance 2 IRF230/231/630/631 IRF232/233/632/633 MTP12N18/12N20		0.40	Ω	V _{GS} =10V, I _D =5.0A I _D =6.0A
			0.50		
			0.35		
V _{DS(on)}	Drain-Source On-Voltage ² MTP12N18/12N20		2.1	V	V _{GS} =10V; I _D =6.0A
			5.0	V	V _{GS} =10V; I _D =12.0A;
			4.2	V	V _{GS} =10V; I _D =6.0A Tc=100
g _{fs}	Forward Transconductance	3.0		S(Ω)	V _{DS} =10V; I _D =6.0A Tc=100
Dynamic Characteristics					
C _{iss}	Input Capacitance		800	pF	V _{DS} =25V, V _{GS} =0V f=1.0MHz
C _{oss}	Output Capacitance		450	pF	
C _{rss}	Reverse Transfer Capacitance		150	pF	
Switching Characteristics (Tc=25, Figure 1,2) ¹					
t _{d(on)}	Turn-On Delay Time		30	ns	V _{DD} =90V, I _D =5.0A V _{GS} =10V, R _{GEN} =15 Ω R _{GS} =15 Ω
t _r	Rise Time		50	ns	
t _{d(off)}	Turn-Off Delay Time		50	ns	
t _f	Fall Time		40	ns	
t _{d(on)}	Turn-On Delay Time		50	ns	V _{DD} =25V; I _D =6.0A V _{GS} =10V, R _{GEN} =50 Ω R _{GS} =50 Ω
t _r	Rise Time		250	ns	
t _{d(off)}	Turn-Off Delay Time		100	ns	
t _f	Fall Time		120	ns	
Q _g	Total Gate Charge		30	ns	V _{GS} =10V, I _D =12A V _{DD} =120V

Electrical Characteristics (Cont.) (Tc=25 unless otherwise noted)

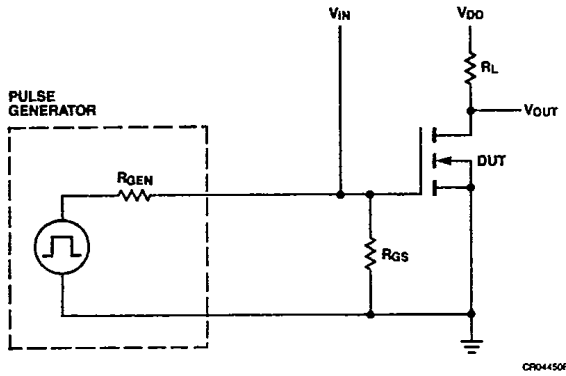
Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V _{SD}	Diode Forward Voltage IRF230/231/630/831 IRF232/233/632/633	1.25	2.0	V	I _S =9.0A; V _{GS} =0V
		1.25	1.8	V	I _S =8.0A; V _{GS} =0V
t _{rr}	Reverse Recovery Time	450		ns	I _S =4.0A; I _S /dt=25A/μs

Notes

1. T_J=+25 to +160
2. Pulse width limited by T_J.
3. Switching time measurements performed on LEM TR-58 equipment.

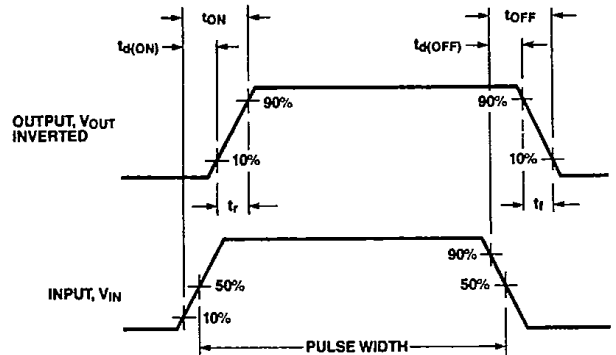
Typical Electrical Characteristics

Figure 1 Switching Test Circuit



CR04450F

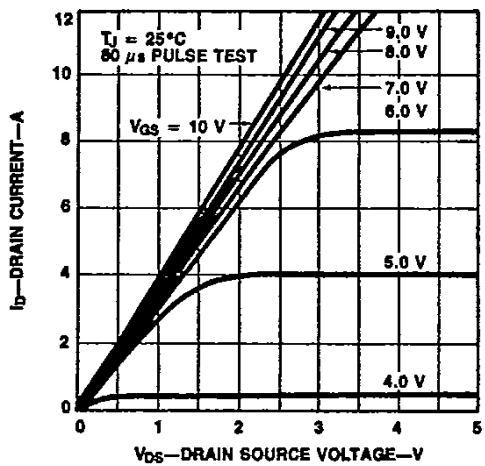
Figure 2 Switching Waveforms



WF00600F

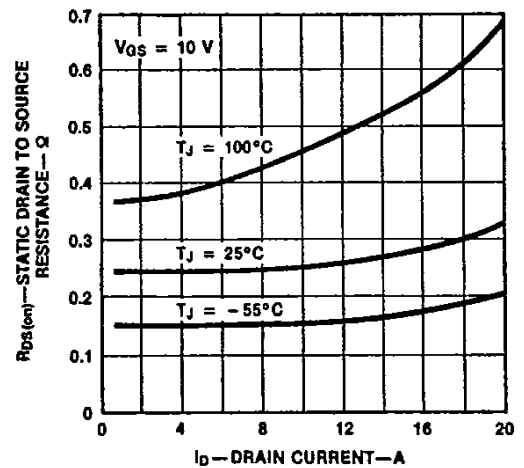
Typical Performance Curves

Figure 3 Output Characteristics



PC10260F

Figure 4 Static Drain to Source Resistance vs Drain Current



PC10270F

Typical Performance Curves (Cont.)

Figure 5 Transfer Characteristics

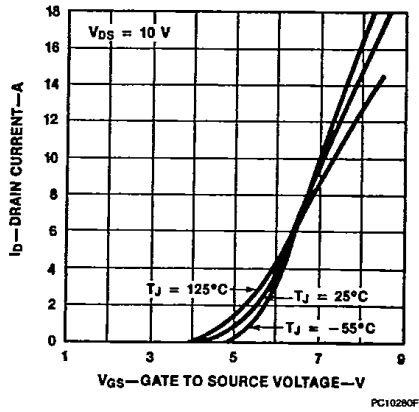


Figure 6 Temperature Variation of Gate to Source Threshold Voltage

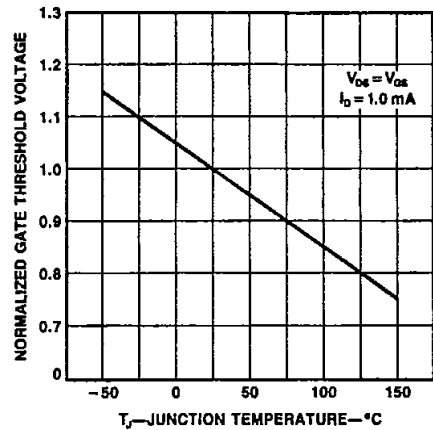


Figure 7 Capacitance vs Drain to Source Voltage

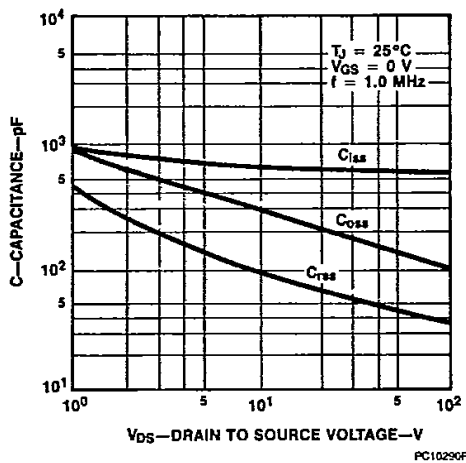


Figure 8 Gate to Source Voltage vs Total Gate Charge

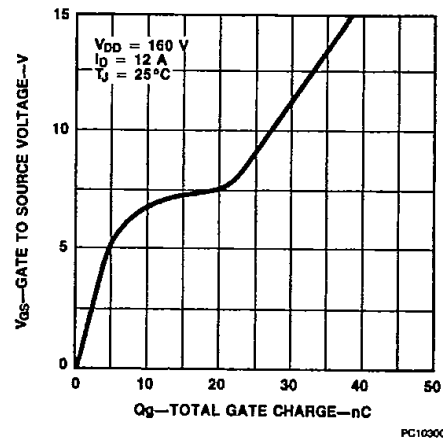


Figure 9 Forward Biased Safe Operating Area For IRF230-233 and IRF630-633

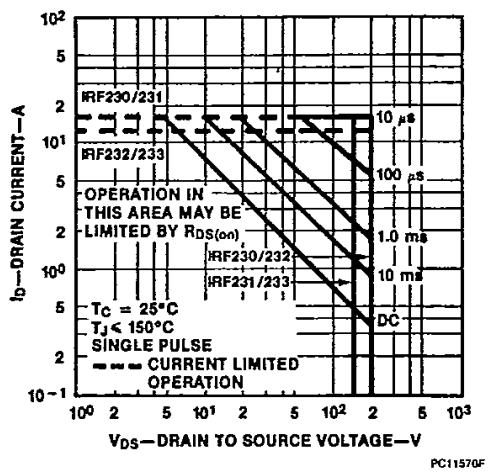
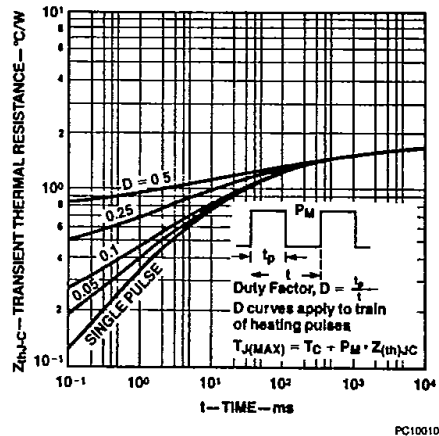


Figure 10 Transient Thermal Resistance vs Time For IRF230-233 and IRF630-633



Typical Performance Curves (Cont.)

Figure 11 Forward Biased Safe Operating Area
For MTP12N18/12N20

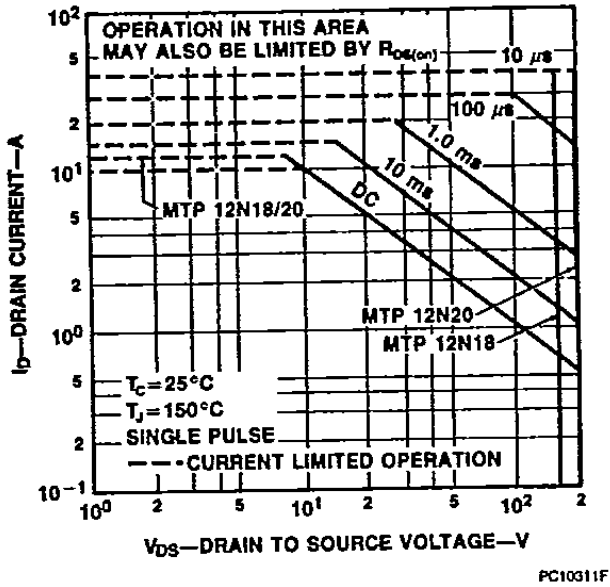


Figure 12 Transient Thermal Resistance vs Time
For MTP12N18/12N20

