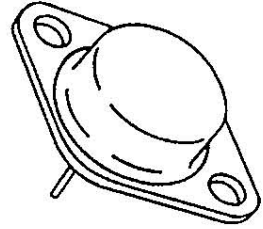


Description

These devices 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

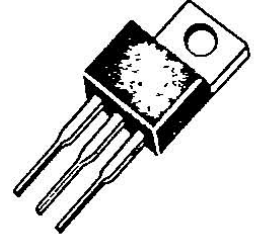
TO-204AA



IS00020F

- IRF420
- IRF421
- IRF422
- IRF423

TO-220AB



IS00010F

- IRF820
- IRF821
- IRF822
- IRF823
- MTP2N45
- MTP2N50

Product Summary

Part Number	V_{DSS}	$R_{DS(on)}$	I_D at $T_c=25$	I_D at $T_c=100$	Case Style
IRF420	500V	3.0 Ω	2.5A	1.5A	TO-204AA
IRF421	450V	3.0 Ω	2.5A	1.5A	
IRF422	500V	4.0 Ω	2.0A	1.0A	
IRF423	450V	4.0 Ω	2.0A	1.0A	
IRF820	500V	3.0 Ω	2.5A	1.5A	TO-220AB
IRF821	450V	3.0 Ω	2.5A	1.5A	
IRF822	500V	4.0 Ω	2.0A	1.0A	
IRF823	450V	4.0 Ω	2.0A	1.0A	
MTP2N45	450V	4.0 Ω	3.0A	2.0A	
MTP2N50	500V	4.0 Ω	3.0A	2.0A	

Notes

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



IRF420-423/IRF820-823
MTP2N45/2N50
N-Channel Power MOSFETs
3.0A, 450V/500V

Maximum Ratings

Symbol	Characteristic	Rating IRF420/422 IRF820/822 MTP2N50	Rating IRF421/423 IRF821/823 MTP2N45	Unit
V _{DSS}	Drain to Source Voltage 1	500	450	V
V _{DGR}	Drain to Gate Voltage 1 R _{GS} =20kΩ	500	450	V
V _{GS}	Gate to Source Voltage	±20	±20	V
T _J , T _{stg}	Operating Junction and Storage Temperatures	-55 to +150	-55 to +150	
TL	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5s	275	275	

Maximum Thermal Characteristics

		IRF420-423/ IRF820-823	MTP2N45/2N50	
R _{θJC}	Thermal Resistance, Junction to Case	3.12	1.67	/W
R _{θJA}	Thermal Resistance, Junction to Ambient	30/80	80	/W
P _D	Total Power Dissipation at T _c =25	40	75	W
I _{DM}	Pulsed Drain Current ²	10	10	A

Electrical Characteristics (T_c=25 unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
V _{(BR)DSS}	Drain Source Breakdown Voltage ¹ IRF420/422/820/822 MTP2N50	500		V	V _{GS} =0V, I _D =250μA
		450			
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, T _c =125
I _{GSS}	Gate-Body Leakage Current IRF420-423 IRF820-823/MTP2N45/50		±100	nA	V _{GS} =±20V, V _{DS} =0V
			±500		



IRF420-423/IRF820-823
MTP2N45/2N50
N-Channel Power MOSFETs
3.0A, 450V/500V

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

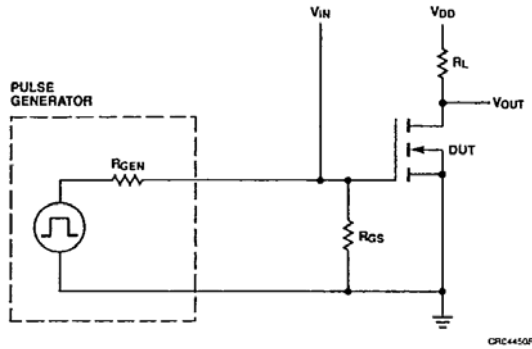
Symbol	Characteristic	Min	Max	Unit	Test Conditions
On characteristics					
V _{GS(th)}	Gate Threshold Voltage	2.0	4.0	V	I _D =250μA, V _{DS} =V _{GS} I _D =1.0mA, V _{DS} =V _{GS}
	IRF420-423/IRF820-823 MTP2N45/MTP2N50	2.0	4.5		
R _{DS(on)}	Static Drain-Source On-Resistance 2			Ω	V _{GS} =10V, I _D =1.0A
	IRF420/421/820/821		3.0		
	IRF422/423/822/823		4.0		
	MTP2N45/50		4.0		
V _{DS(on)}	Drain-Source On-Voltage2			V	V _{GS} =10V; I _D =2.0A
	MTP2N45/50		10	V	V _{GS} =10V; I _D =1.0A
				8	V
gfs	Forward Transconductance	1.0		S(Ω)	V _{DS} =10V, I _D =1.0A
Dynamic Characteristics					
Ciss	Input Capacitance		400	pF	V _{DS} =25V, V _{GS} =0V f=1.0MHz
Coss	Output Capacitance		100	pF	
Crss	Reverse Transfer Capacitance		40	pF	
Switching Characteristics (Tc=25, Figure 1,2) ³					
td(on)	Turn-On Delay Time		40	ns	V _{DD} =250V, I _D =1.0A V _{GS} =10V, R _{GEN} =50 Ω R _{GS} =50 Ω
tr	Rise Time		50	ns	
td(off)	Turn-Off Delay Time		60	ns	
tf	Fall Time		60	ns	
Qg	Total Gate Charge		15	nC	V _{GS} =10V, I _D =3.0A V _{DD} =200V
Symbol Characteristic Typ Max Unit Test Conditions					
Source-Drain Diode Characteristics					
V _{SD}	Diode Forward Voltage		1.4	V	I _S =2.5A; V _{GS} =0V
			1.3	V	I _S =2.0A; V _{GS} =0V
trr	Reverse Recovery Time	600		ns	I _S =2.5A; dI _S /dt=100A/μS

Notes

1. T_J=+25 to +150
2. Pulse width limited by T_J
3. Switching time measurements performed on LEM TR-58 test equipment.

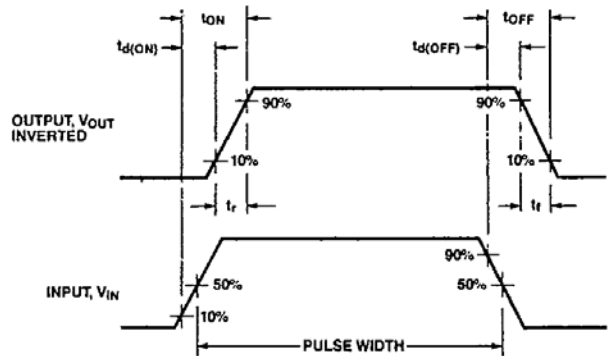
Typical Electrical Characteristics

Figure 1 Switching Test Circuit



CRC4450F

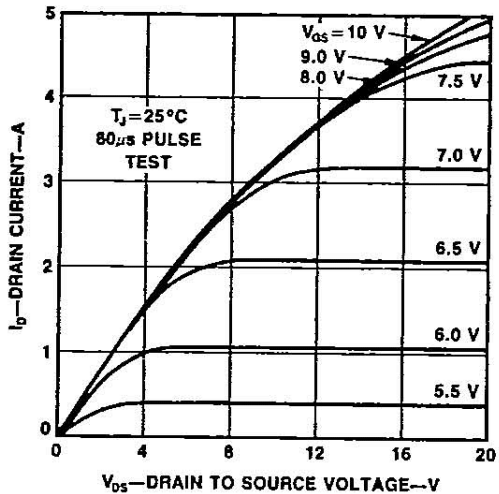
Figure 2 Switching Waveforms



WFO0600F

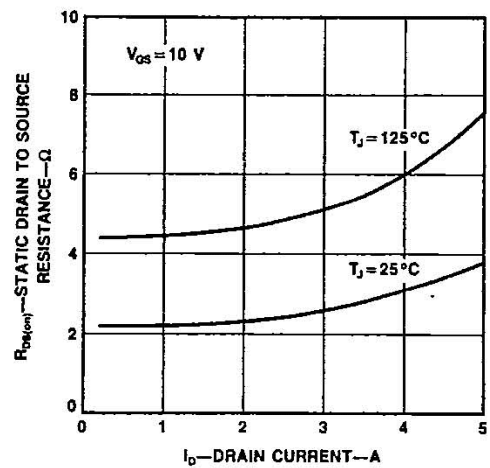
Typical Performance Curves

Figure 3 Output Characteristics



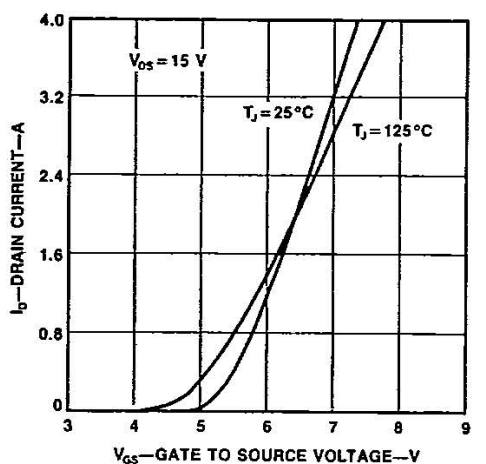
PC10720F

Figure 4 Static Drain to Source Resistance vs Drain Current



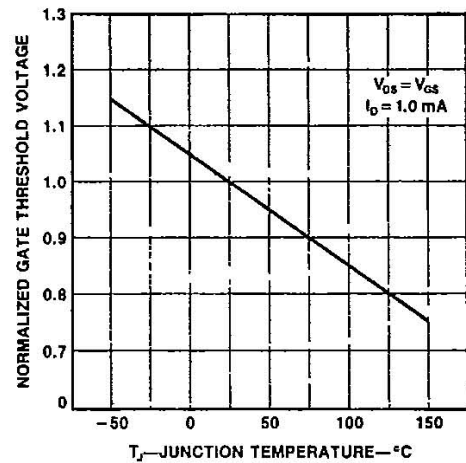
PC10730F

Figure 5 Transfer Characteristics



PC10740F

Figure 6 Temperature Variation of Gate to Source Threshold Voltage



PC09841F

Typical Performance Curves (Cont.)

Figure 7 Capacitance vs Drain to Source Voltage

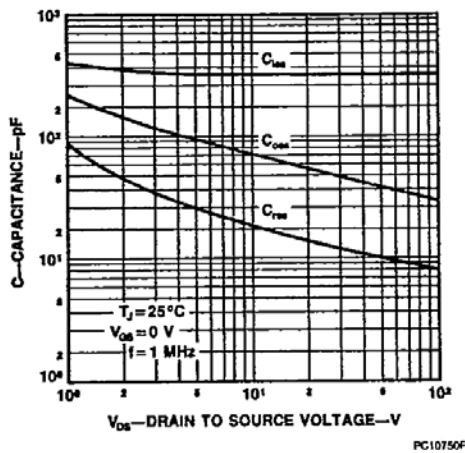


Figure 9 Forward Biased Safe Operating Area for IRF420-423 and IRF820-823

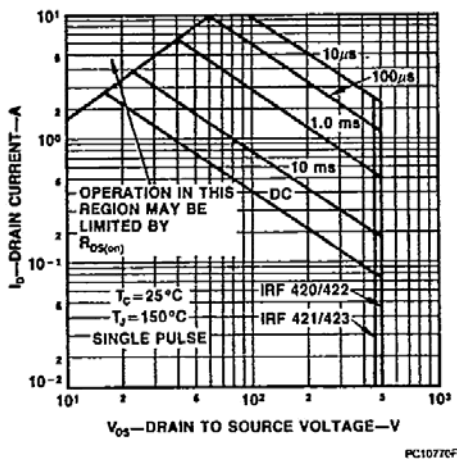


Figure 11 Forward Biased Safe Operating Area for MTP2N45/2N50

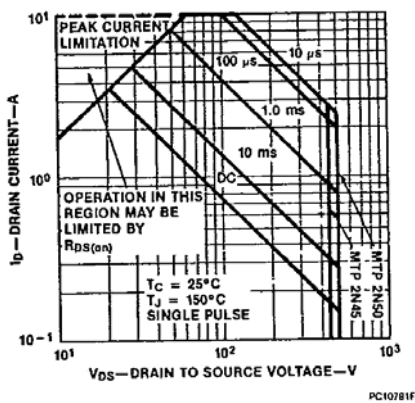


Figure 8 Gate to Source Voltage VS Total Gate Charge

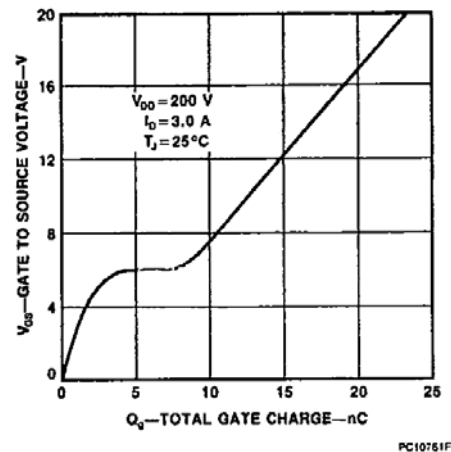


Figure 10 Transient Thermal Resistance vs Time for IRF420-423 and IRF820-823

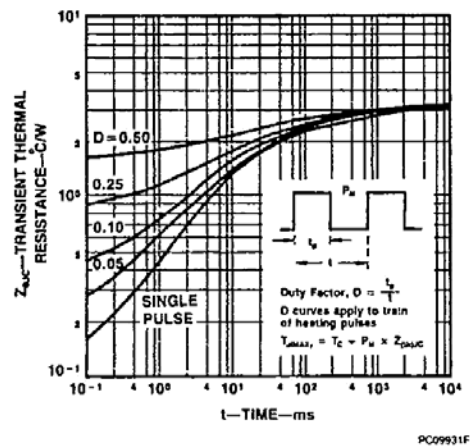


Figure 12 Transient Thermal Resistance vs time for MTP2N45/2N50

