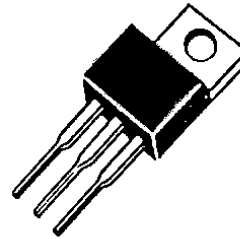


Description

The 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 Parallelling

TO-220AB



IS00019F

- IRF510
- IRF511
- IRF512
- IRF513
- MTP4N08
- MTP4N10

Maximum Ratings

Symbol	Characteristic	Rating IRF510/512 MTP4N10	Rating MTP4N08	Rating IRF511/513	Unit
V_{DSS}	Drain to Source Voltage 1	100	80	60	V
V_{DGR}	Drain to Gate Voltage 1 $R_{GS}=20k \Omega$	100	80	60	V
V_{GS}	Gate to Source Voltage	± 20	± 20	± 20	V
T_J, T_{stg}	Operating Junction and Storage Temperatures	-55 to +150	-55 to +150	-55 to +150	
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5s	275	275	275	

Maximum On-State Characteristics

		IRF510/511	IRF512/513	MTP4N08/10	
$R_{DS(on)}$	Static Drain-to-Source On Resistance	0.60	0.80	0.80	Ω
I_D	Drain Current				A
	Continuous at $T_c=25$	4.0	3.5	5.0	
	Continuous at $T_c=100$	2.5	2.0	3.5	
	Pulsed	16	14	14	

Maximum Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	6.4	6.4	2.5	/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	80	80	80	/W
P_D	Total Power Dissipation at $T_c=25$	20	20	50	W

Notes

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

Electrical Characteristics (Tc=25 unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
V _{(BR)DSS}	Drain Source Breakdown Voltage ¹			V	V _{GS} =0V, I _D =250μA
	IRF510/512/MTP4N10	100			
	MTP4N08	80			
	IRF511/513	60			
I _{DSS}	Zero Gate Voltage Drain Current		250	μA	V _{DS} =Rated V _{DSS} , V _{GS} =0V
			100	μA	V _{DS} =0.8 x Rated V _{DSS} , V _{GS} =0V, Tc=125
I _{GSS}	Gate-Body Leakage Current		±500	nA	V _{GS} =±20V, V _{DS} =0V
On Characteristics					
V _{GS(th)}	Gate Threshold Voltage			V	I _D =250μA, V _{DS} =V _{GS}
	IRF510-513	2.0	4.0		
	MTP4N08/10	2.0	4.5		
R _{DS(on)}	Static Drain-Source On-Resistance ²			Ω	V _{GS} =10V, I _D =2.0A
	IRF510/511		0.60		
	IRF512/513/MTP4N08/4N10		0.80		
V _{DS(on)}	Drain-Source On-Voltage ²		4.8	V	V _{GS} =10V; I _D =4.0A
	MTP4N08/4N10		3.2	V	V _{GS} =10V; I _D =2.0A; T _C =100
g _{fs}	Forward Transconductance	1.0		S(Ω)	V _{DS} =10V, I _D =2.0A
Dynamic Characteristics					
C _{iss}	Input Capacitance		200	pF	V _{DS} =25V, V _{GS} =0V F=1.0MHz
C _{oss}	Output Capacitance		100	pF	
C _{rss}	Reverse Transfer Capacitance		30	pF	
Switching Characteristics (Tc=25, Figure 11,12) ³					
td(on)	Turn-On Delay Time		20	ns	V _{DD} =50V, I _D =2.0A
tr	Rise Time		25	ns	V _{GS} =10V, R _{GEN} =50 Ω
td(off)	Turn-Off Delay Time		25	ns	R _{GS} =50 Ω
tf	Fall Time		20	ns	
Qg	Total Gate Charge		7.5	nC	V _{GS} =10V, I _D =8.0A V _{DD} =40V

Electrical Characteristics (Cont.) ($T_c=25$ unless otherwise noted)

Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V_{SD}	Diode Forward Voltage			V	$I_S=4.0A; V_{GS}=0V$
	IRF510/511		2.5		
	IRF512/513		2.0		
trr	Reverse Recovery Time	230		ns	$I_S=4.0A; DI_S/dt=25A/\mu S$

Notes

- $T_J=+25$ to $+150$
- Pulse test; Pulse width $\leq 80\mu s$, Duty cycle $\leq 1\%$
- Switching time measurements performed on LEM TR-58 test equipment

Typical Performance Curves

Figure 1 Output Characteristics

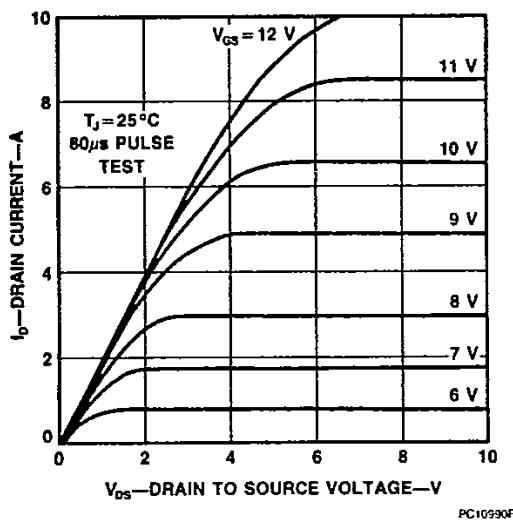


Figure 2 Static Drain to Source Resistance vs Drain Current

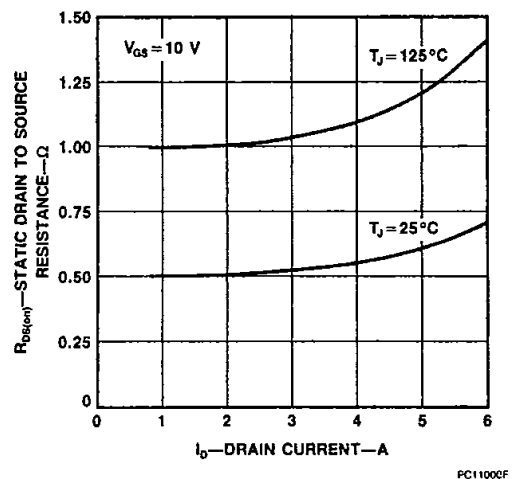


Figure 3 Transfer Characteristics

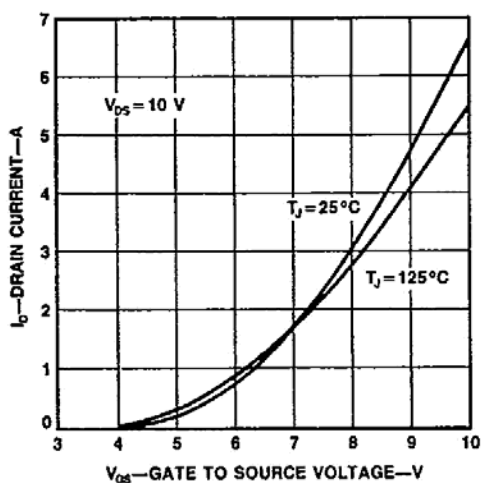
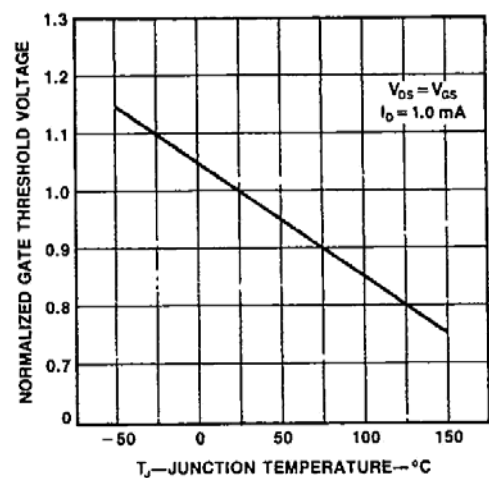
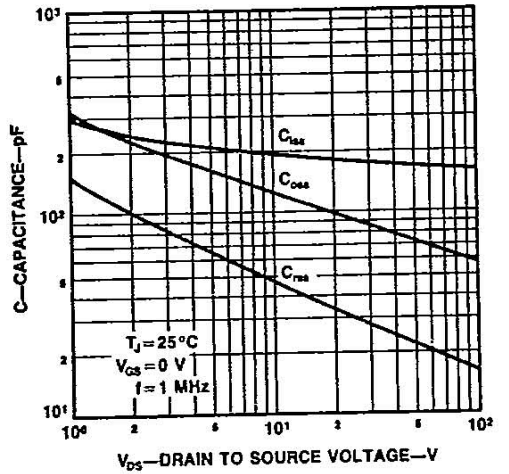


Figure 4 Temperature Variation of Gate to Source Threshold Voltage



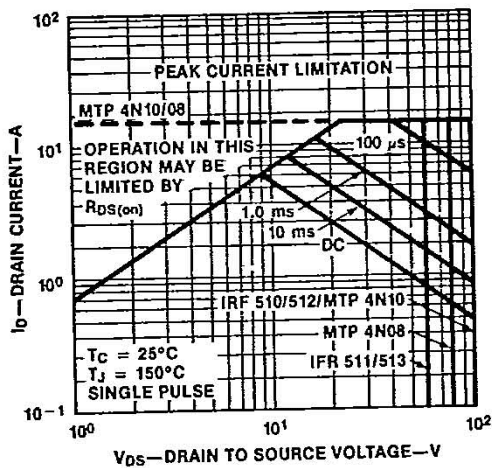
Typical Performance Curves (Cont.)

Figure 5 Capacitance vs Drain to Source Voltage



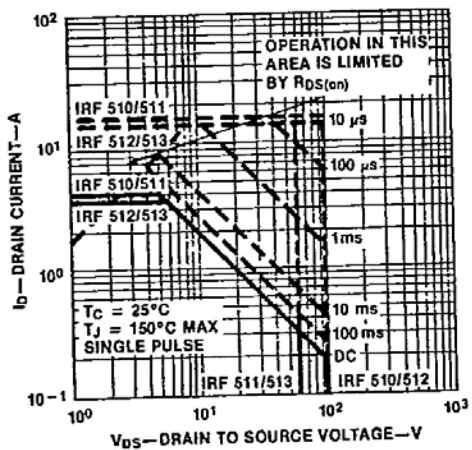
PC11020F

Figure 7 Forward Biased Operating Area for MTP4N08/4N10



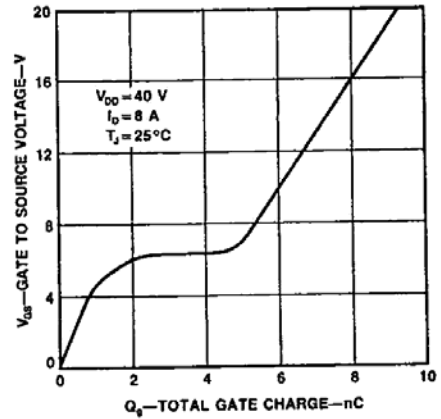
PC11041F

Figure 9 Forward Biased Safe Operating Area For IRF510-513



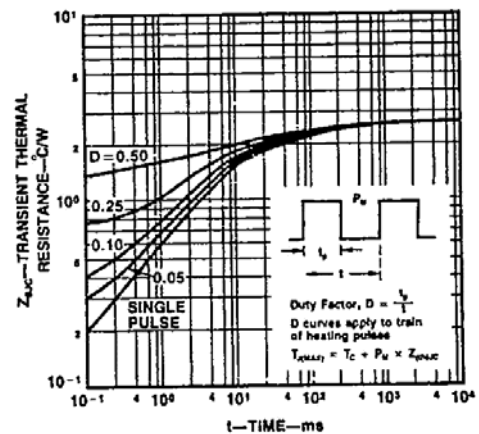
PC12060F

Figure 6 Gate to Source Voltage vs Total Gate Charge



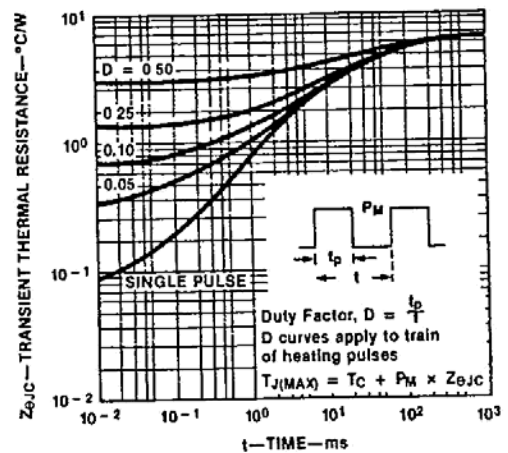
PC11020F

Figure 8 Transient Thermal Resistance vs Time for MTP4N08/4N10



PC11051F

Figure 10 Transient Thermal Resistance vs Time For IRF510-513



PC12070F

Typical Electrical Characteristics

Figure 11 Switching Test Circuit

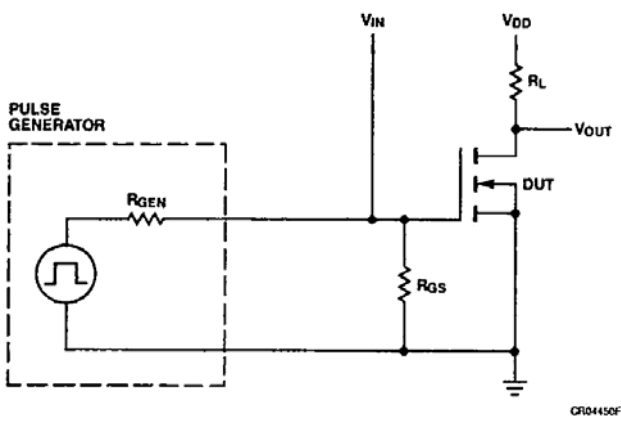


Figure 12 Switching Waveforms

