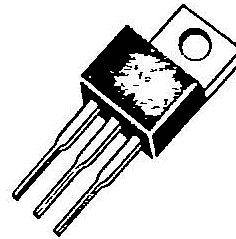


Description

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 driver 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-220AB



1560010F

IRF711
IRF712
IRF713
MTP2N35
MTP2N40

Maximum Ratings

Symbol	Characteristic	Rating IRF710/712 MTP2N40	Rating IRF711/713 MTP2N35	Unit
V_{DSS}	Drain to Source Voltage ¹	400	350	V
V_{DGR}	Drain to Gate Voltage ¹ $R_{GS}=20k \Omega$	400	350	V
V_{GS}	Gate to Source Voltage	± 20	± 20	V
T_J, T_{sgt}	Operating Junction and Storage Temperatures	-55 to +150	-55 to +150	
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5 s	275	275	

Maximum On-State Characteristics

		IRF710-711	IRF712-713	MTP2N35/40	Unit
$R_{DS(on)}$	Static Drain-to-Source On Resistance	3.6	5.0	5.0	Ω
I_D	Drain Current				A
	Continuous at $T_c=25$	1.5	1.4	1.3	
	Continuous at $T_c=100$	1.0	0.9	0.8	
	Pulsed	6.0	5.0	5.0	

Maximum On-State 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 IRF710/712/MTP2N40 IRF711/713/MTP2N35	400		V	V _{GS} =0V, I _D =250μA
		350			
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		±500	μA	V _{GS} =±20V, V _{DS} =0V
On Characteristics					
V _{GS(th)}	Gate Threshold Voltage IRF710-713 MTP2N35/2N40	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 IRF710/711 IRF712/713/MTP2N35/40		3.6	Ω	V _{GS} =10V, I _D =0.8A
			5.0		
V _{DS(on)}	Drain-Source On-Voltage ² MTP2N35/2N40		13	V	V _{GS} =10V, I _D =2.0A
			10	V	V _{GS} =10V, I _D =1.0A, Tc=100
g _{fs}	Forward Transconductance	0.5		S(Ω)	V _{DS} =10V, I _D =0.8A
Dynamic Characteristics					
C _{iss}	Input Capacitance		200	pF	V _{DS} =25V, V _{GS} =0V f=1.0MHz
C _{oss}	Output Capacitance		50	pF	
C _{rss}	Reverse Transfer Capacitance		15	pF	
Switching Characteristics (Tc=25, Figure 11,12) ³					
t _{d(on)}	Turn-On Delay Time		10	ns	V _{DD} =200V, I _D =0.8A V _{GS} =10V, R _{GEN} =50 Ω R _{GS} =50 Ω
t _r	Rise Time		20	ns	
t _{d(off)}	Turn-Off Delay Time		10	ns	
t _f	Fall Time		15	ns	
Q _g	Total Gate Charge		7.5	nC	V _{GS} =10V, I _D =2.0A V _{DD} =200V

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

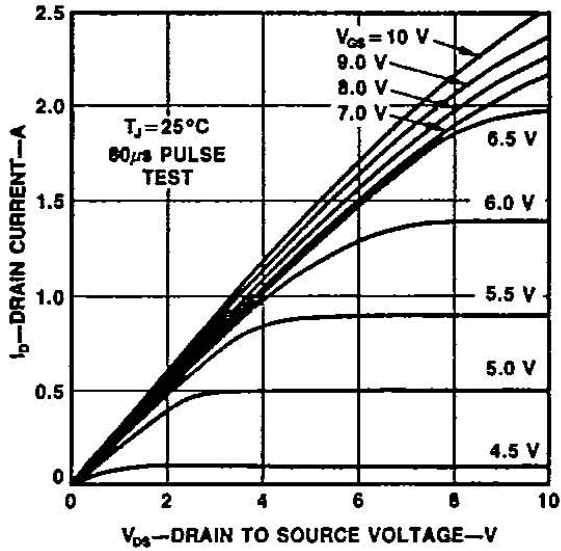
Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V _{SD}	Diode Forward Voltage IRF710/711 IRF712/713		1.6	V	I _S =1.5A; V _{GS} =0V
			1.5	V	I _S =1.3A; V _{GS} =0V
t _{rr}	Reverse Recovery Time	380		ns	I _S =1.5A; dI _S /dt=25A/μS

Notes

- T_J=+25 to +150
- Pulse test: Pulse width ≤ 80μs, Duty cycle ≤ 1%
- Switching time measurements performed on LEM TR-58 test equipment.

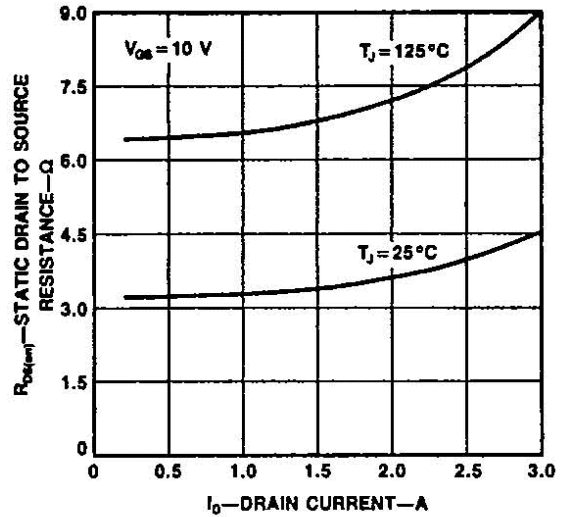
Typical Performance Curves

Figure 1 Output Characteristic



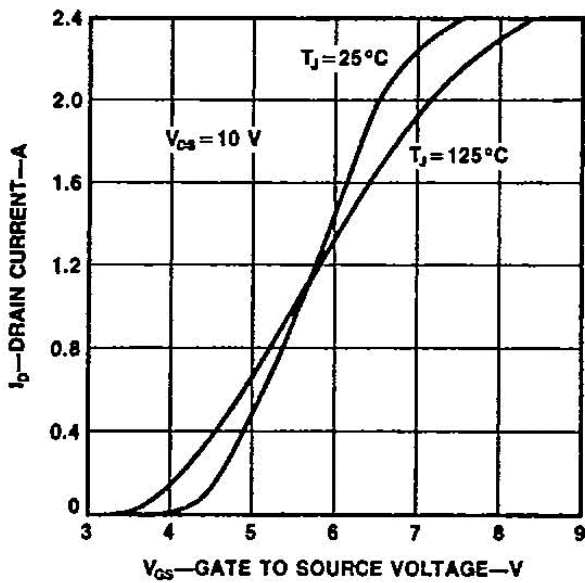
PC11120F

Figure 2 Static Drain to Source Resistance Vs Drain Current



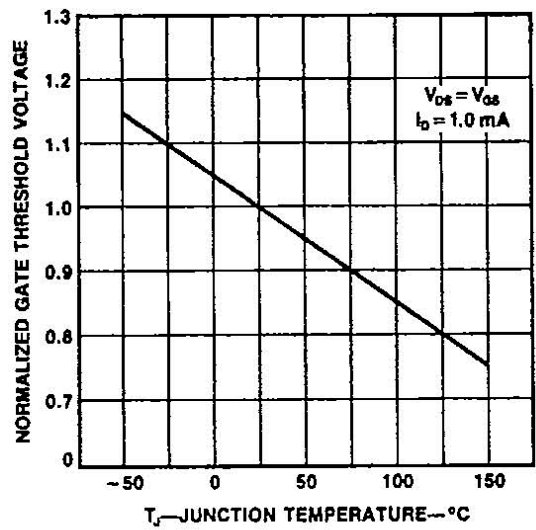
PC11130F

Figure 3 Transfer Characteristics



PC11140F

Figure 4 Temperature Variation of Gate to Source Threshold Voltage



PC09841F

Typical Performance Curves (Cont.)

Figure 5 Capacitance vs Drain to Source Voltage

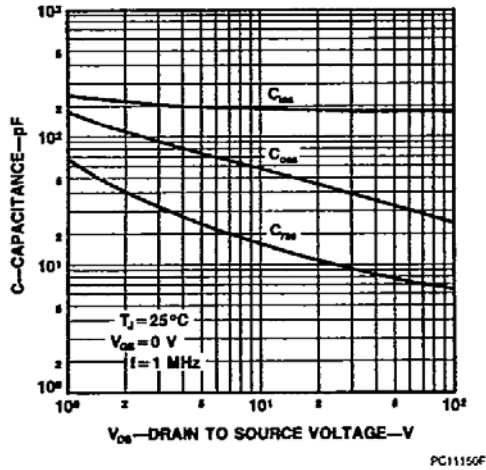


Figure 7 Forward Biased Safe Operating Area for MTP2N35/2N40

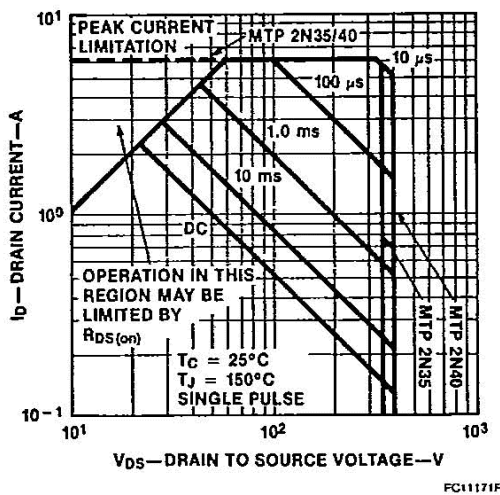


Figure 9 Forward Biased Safe Operating Area for IRF710-713

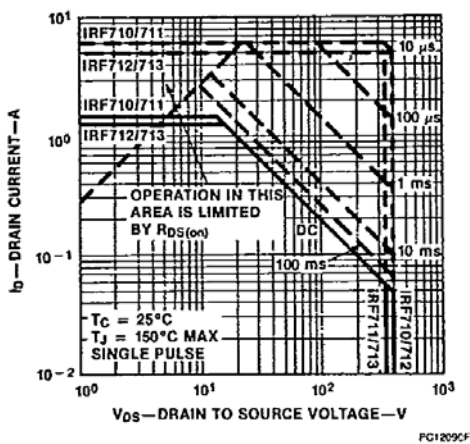


Figure 6 Gate to Source Voltage vs Total Gate Charge

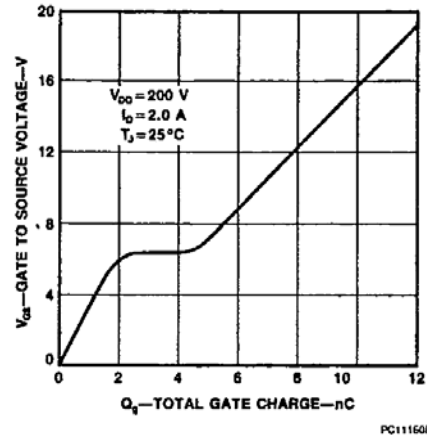


Figure 8 Transient Thermal Resistance vs Time for MTP2N35/2N40

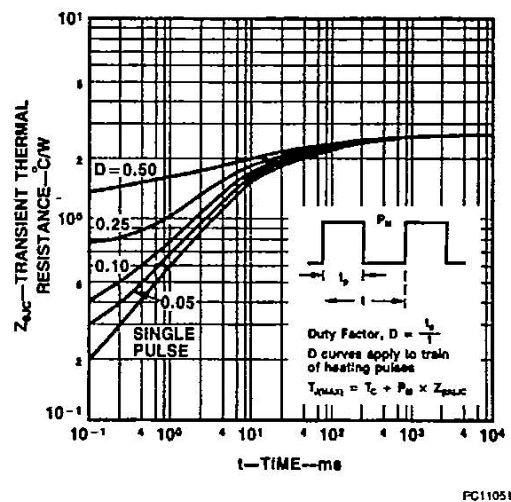
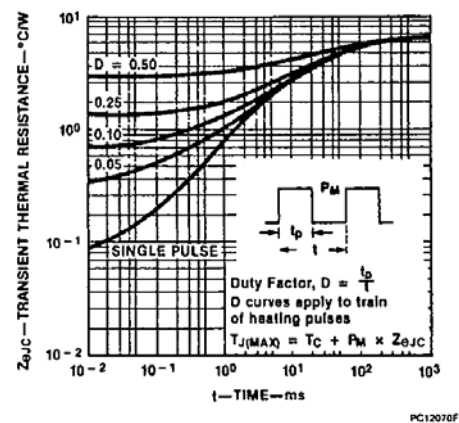


Figure 10 Transient Thermal Resistance for IRF710-713



Typical Electrical Characteristics

Figure 11 Switching Test Circuit

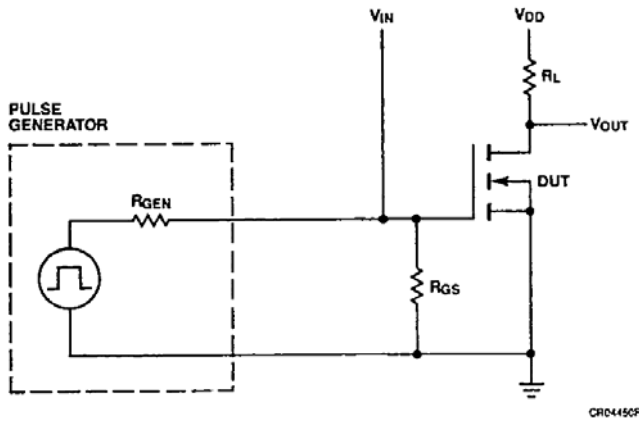


Figure 12 Switching Waveforms

