

**IRF440-443/IRF840-843
 MTM7N45/7N50
 N-Channel Power MOSFETs,
 8 A, 450 V/500 V**

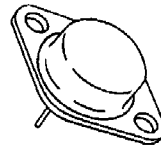
Power And Discrete Division

Description

These devices are n-channel, enhancement mode, power MOSFETs designed especially for high voltage, high speed applications, such as off-line switching power supplies, UPS, AC and DC motor controls, relay and solenoid drivers.

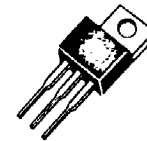
- V_{GS} Rated at ± 20 V
- Silicon Gate for Fast Switching Speeds
- I_{DSS} , $V_{DS(on)}$, SOA and $V_{GS(th)}$ Specified at Elevated Temperature
- Rugged

TO-204AA



IRF440
 IRF441
 IRF442
 IRF443
 MTM7N45
 MTM7N50

TO-220AB



IRF840
 IRF841
 IRF842
 IRF843

Maximum Ratings

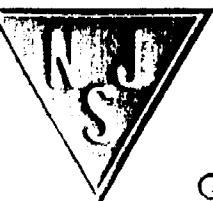
Symbol	Characteristic	Rating IRF440/442 IRF840/842 MTM7N50	Rating IRF441/443 IRF841/843 MTM7N45	Unit
V_{DSS}	Drain to Source Voltage	500	450	V
V_{DGR}	Drain to Gate Voltage $R_{GS} = 20 \text{ k}\Omega$	500	450	V
V_{GS}	Gate to Source Voltage	± 20	± 20	V
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +150	-55 to +150	$^{\circ}\text{C}$
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5 s	275	275	$^{\circ}\text{C}$

Maximum On-State Characteristics

		IRF440/441 IRF840/841	IRF442/443 IRF842/843	MTM7N45 MTM7N50	
$R_{DS(on)}$	Static Drain-to-Source On Resistance	0.85	1.1	0.8	Ω
I_D	Drain Current	8	7	7	A
	Continuous	32	28	40	
	Pulsed				

Maximum Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.0	1.0	0.83	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	60	60	60	$^{\circ}\text{C}/\text{W}$
P_D	Total Power Dissipation at $T_C = 25^{\circ}\text{C}$	125	125	150	W



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MTM7N45/7N50

Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage ¹			V	$V_{GS} = 0\text{ V}, I_D = 5.0\text{ mA}$
	MTM7N50	500			
	MTM7N45	450			
I_{DSS}	Zero Gate Voltage Drain Current		0.25	mA	$V_{DS} = 0.85 \times \text{Rated } V_{DSS}, V_{GS} = 0\text{ V}$
			2.5	mA	$V_{DS} = 0.85 \times \text{Rated } V_{DSS}, V_{GS} = 0\text{ V}, T_C = 100^\circ\text{C}$
I_{GSS}	Gate-Body Leakage Current		± 500	nA	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.5	V	$I_D = 1.0\text{ mA}, V_{DS} = V_{GS}$
		1.5	4.0	V	$I_D = 1.0\text{ mA}, V_{DS} = V_{GS}, T_C = 100^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance ²		0.8	Ω	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$
$V_{DS(on)}$	Drain-Source On-Voltage ²		2.8	V	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$
			7.0	V	$V_{GS} = 10\text{ V}, I_D = 7.0\text{ A}$
			5.6	V	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}, T_C = 100^\circ\text{C}$
g_{fs}	Forward Transconductance	4.0		S (Ω)	$V_{DS} = 10\text{ V}, I_D = 4.0\text{ A}$
Dynamic Characteristics					
C_{iss}	Input Capacitance		1800	pF	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$
C_{oss}	Output Capacitance		350	pF	
C_{riss}	Reverse Transfer Capacitance		150	pF	
Switching Characteristics ($T_C = 25^\circ\text{C}$, Figures 9, 10)³					
$t_{d(on)}$	Turn-On Delay Time		60	ns	$V_{DD} = 25\text{ V}, I_D = 3.5\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 50\ \Omega, R_{GS} = 50\ \Omega$
t_r	Rise Time		150	ns	
$t_{d(off)}$	Turn-Off Delay Time		200	ns	
t_f	Fall Time		120	ns	
Q_g	Total Gate Charge		60	nC	
					$V_{GS} = 10\text{ V}, I_D = 12\text{ A}, V_{DD} = 400\text{ V}$

IRF440-443/IRF840-843

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
V _{(BR)DSS}	Drain Source Breakdown Voltage ¹ IRF440/442/840/842 IRF441/443/842/843			V	V _{GS} = 0 V, I _D = 250 μA
		500			
		450			
I _{DSS}	Zero Gate Voltage Drain Current		250	μA	V _{DS} = Rated V _{DSS} , V _{GS} = 0 V
			1000	μA	V _{DS} = 0.8 x Rated V _{DSS} , V _{GS} = 0 V, T _C = 125°C
I _{GSS}	Gate-Body Leakage Current IRF440-443 IRF840-843			nA	V _{GS} = ± 20 V, V _{DS} = 0 V
			± 100		
			± 500		
On Characteristics					
V _{GS(th)}	Gate Threshold Voltage	2.0	4.0	V	I _D = 250 μA, V _{DS} = V _{GS}
R _{DS(on)}	Static Drain-Source On-Resistance ² IRF440/441/840/841 IRF442/443/842/843			Ω	V _{GS} = 10 V, I _D = 4.0 A
			0.85		
			1.10		
g _{fs}	Forward Transconductance	4.0		S (℧)	V _{DS} = 10 V, I _D = 4.0 A
Dynamic Characteristics					
C _{iss}	Input Capacitance		1600	pF	V _{DS} = 25 V, V _{GS} = 0 V f = 1.0 MHz
C _{oss}	Output Capacitance		350	pF	
C _{rss}	Reverse Transfer Capacitance		150	pF	
Switching Characteristics (T_C = 25°C, Figures 9, 10)					
t _{d(on)}	Turn-On Delay Time		35	ns	V _{DD} = 220 V, I _D = 4.0 A V _{GS} = 10 V, R _{GEN} = 4.7 Ω R _{GS} = 4.7 Ω
t _r	Rise Time		15	ns	
t _{d(off)}	Turn-Off Delay Time		90	ns	
t _f	Fall Time		30	ns	
Q _g	Total Gate Charge		60	nC	V _{GS} = 10 V, I _D = 12 A V _{DD} = 400 V
Source-Drain Diode Characteristics					
V _{SD}	Diode Forward Voltage IRF440/441/840/841 IRF442/443/842/843		2.0	V	I _S = 8.0 A; V _{GS} = 0 V
			1.9	V	I _S = 7.0 A; V _{GS} = 0 V
t _{rr}	Reverse Recovery Time	700		ns	I _S = 8.0 A; dI _S /dt = 100 A/μS