

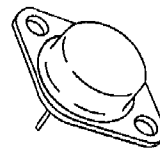
**IRF430-433/IRF830-833  
 MTM/MTP4N45/4N50  
 N-Channel Power MOSFETs,  
 4.5 A, 450 V/500 V**

**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.

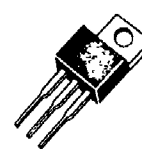
- $V_{GS}$  Rated at  $\pm 20$  V
- Silicon Gate for Fast Switching Speeds
- $I_{DSS}$ ,  $V_{DS(on)}$ , SOA and  $V_{GS(th)}$  Specified at Elevated Temperature
- Rugged

TO-204AA



IRF430  
 IRF431  
 IRF432  
 IRF433  
 MTM4N45  
 MTM4N50

TO-220AB



IRF830  
 IRF831  
 IRF832  
 IRF833  
 MTP4N45  
 MTP4N50

**Maximum Ratings**

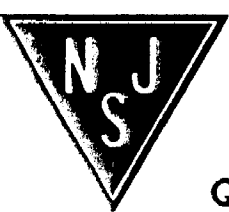
Symbol	Characteristic	Rating IRF430/432 IRF830/832 MTM/MTP4N50	Rating IRF431/433 IRF831/833 MTM/MTP4N45	Unit
$V_{DSS}$	Drain to Source Voltage	500	450	V
$V_{DGR}$	Drain to Gate Voltage $R_{GS} = 20 \text{ k}\Omega$	500	450	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	$\pm 20$	V
$T_J, T_{stg}$	Operating 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**

		IRF430/431 IRF830/831	IRF432/433 IRF832/833	MTM/MTP4N45 MTM/MTP4N45	
$R_{DS(on)}$	Static Drain-to-Source On Resistance	1.5	2.0	1.5	$\Omega$
$I_D$	Drain Current				A
	Continuous	4.5	4.0	4.0	
	Pulsed	18	16	10	

**Maximum Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.67	1.67	1.67	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	60	60	60	$^{\circ}\text{C}/\text{W}$
$P_D$	Total Power Dissipation at $T_C = 25^{\circ}\text{C}$	75	75	75	W



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## IRF430-433/IRF830-833

### Electrical Characteristics (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
<b>Off Characteristics</b>					
V <sub>(BR)DSS</sub>	Drain Source Breakdown Voltage <sup>1</sup> IRF430/432/830/832 IRF431/433/831/833	500		V	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA
		450			
I <sub>DSS</sub>	Zero Gate Voltage Drain Current		250	μA	V <sub>DS</sub> = Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 V
			1000	μA	V <sub>DS</sub> = 0.8 x Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 V, T <sub>C</sub> = 125°C
I <sub>GSS</sub>	Gate-Body Leakage Current IRF430-433 IRF830-833			nA	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V
			±100		
			±500		

### On Characteristics

V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	4.0	V	I <sub>D</sub> = 250 μA, V <sub>DS</sub> = V <sub>GS</sub>
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup> IRF430/431/830/831 IRF432/433/832/833			Ω	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 2.5 A
			1.5		
			2.0		
g <sub>fs</sub>	Forward Transconductance	2.5		S (Ω)	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 2.5 A

### Dynamic Characteristics

C <sub>iss</sub>	Input Capacitance		800	pF	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V f = 1.0 MHz
C <sub>oss</sub>	Output Capacitance		200	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		60	pF	

### Switching Characteristics (T<sub>C</sub> = 25°C, Figures 12, 13)

t <sub>d(on)</sub>	Turn-On Delay Time		30	ns	V <sub>DD</sub> = 225 V, I <sub>D</sub> = 2.5 A V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 15 Ω R <sub>GS</sub> = 15 Ω
t <sub>r</sub>	Rise Time		30	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time		55	ns	
t <sub>f</sub>	Fall Time		30	ns	
Q <sub>g</sub>	Total Gate Charge		30	nC	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 7.0 A V <sub>DS</sub> = 180 V

Symbol	Characteristic	Typ	Max	Unit	Test Conditions
<b>Source-Drain Diode Characteristics</b>					
V <sub>SD</sub>	Diode Forward Voltage IRF430/431/830/831		1.4	V	I <sub>S</sub> = 4.5 A; V <sub>GS</sub> = 0 V
	IRF432/433/832/833		1.3	V	I <sub>S</sub> = 4.0 A; V <sub>GS</sub> = 0 V
t <sub>rr</sub>	Reverse Recovery Time	600		ns	I <sub>S</sub> = 4.5 A; di <sub>S</sub> /dt = 100 A/μS

#### Notes

- T<sub>J</sub> = +25°C to +150°C
- Pulse test: Pulse width ≤ 80 μs, Duty cycle ≤ 1%

## MTM/MTP4N45/4N50

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

Symbol	Characteristic	Min	Max	Unit	Test Conditions
<b>Off Characteristics</b>					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage <sup>1</sup> MTM/MTP4N50 MTM/MTP4N45			V	$V_{GS} = 0\text{ V}, I_D = 5.0\text{ mA}$
		500			
		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		$\pm 500$	nA	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$
<b>On Characteristics</b>					
$V_{GS(th)}$	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 <sup>2</sup>		1.5	$\Omega$	$V_{GS} = 10\text{ V}, I_D = 2.0\text{ A}$
$V_{DS(on)}$	Drain-Source On-Voltage <sup>2</sup>		3.0	V	$V_{GS} = 10\text{ V}, I_D = 2.0\text{ V}$
			7.0	V	$V_{GS} = 10\text{ V}, I_D = 4.0\text{ A}$
			6.0	V	$V_{GS} = 10\text{ V}, I_D = 4.0\text{ A}, T_C = 100^\circ\text{C}$
$g_{fs}$	Forward Transconductance	2.0		S (S)	$V_{DS} = 10\text{ V}, I_D = 2.0\text{ A}$
<b>Dynamic Characteristics</b>					
$C_{iss}$	Input Capacitance		1200	pF	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$ $f = 1.0\text{ MHz}$
$C_{oss}$	Output Capacitance		300	pF	
$C_{rss}$	Reverse Transfer Capacitance		80	pF	
<b>Switching Characteristics (<math>T_C = 25^\circ\text{C}</math>, Figures 12, 13)<sup>3</sup></b>					
$t_{d(on)}$	Turn-On Delay Time		50	ns	$V_{DD} = 25\text{ V}, I_D = 2.0\text{ A}$ $V_{GS} = 10\text{ V}, R_{GEN} = 50\ \Omega$ $R_{GS} = 50\ \Omega$
$t_r$	Rise Time		100	ns	
$t_{d(off)}$	Turn-Off Delay Time		200	ns	
$t_f$	Fall Time		100	ns	
$Q_g$	Total Gate Charge		60	nC	$V_{GS} = 10\text{ V}, I_D = 7.0\text{ A}$ $V_{DD} = 180\text{ V}$

#### Notes

1.  $T_J = +25^\circ\text{C}$  to  $+150^\circ\text{C}$
2. Pulse test: Pulse width  $\leq 80\ \mu\text{s}$ , Duty cycle  $\leq 1\%$
3. Switching time measurements performed on LEM TR-58 test equipment.