

T-39-13

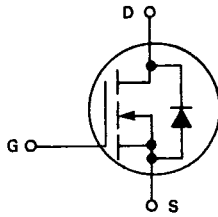
MOTOROLA SEMICONDUCTOR TECHNICAL DATA

**IRF840
IRF841
IRF842
IRF843**

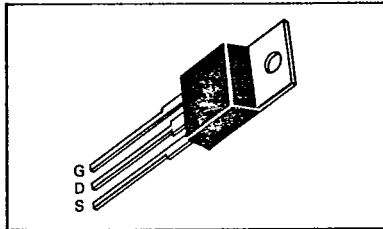
**N-CHANNEL ENHANCEMENT-MODE SILICON GATE
TMOS POWER FIELD EFFECT TRANSISTOR**

These TMOS Power FETs are designed for high voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- Silicon Gate for Fast Switching Speeds
- Low $r_{DS(on)}$ to Minimize On-Losses. Specified at Elevated Temperature
- Rugged — SOA is Power Dissipation Limited
- Source-to-Drain Diode Characterized for Use With Inductive Loads



Part Number	V_{DSS}	$r_{DS(on)}$	I_D
IRF840	500 V	0.85 Ω	8.0 A
IRF841	450 V	0.85 Ω	8.0 A
IRF842	500 V	1.10 Ω	7.0 A
IRF843	450 V	1.10 Ω	7.0 A



MAXIMUM RATINGS

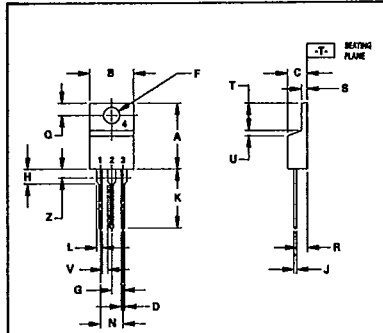
Rating	Symbol	IRF				Unit
		840	841	842	843	
Drain-Source Voltage	V_{DSS}	500	450	500	450	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0 \text{ m}\Omega$)	V_{DGR}	500	450	500	450	Vdc
Gate-Source Voltage	V_{GS}	± 20				Vdc
Drain Current Continuous Pulsed	I_D	8.0		7.0		Acd
	I_{DM}	32		28		
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	125 1.0				Watts W/°C
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150				°C

THERMAL CHARACTERISTICS

Thermal Resistance Junction to Case Junction to Ambient	$R_{\theta JC}$	1.0	°C/W
	$R_{\theta JA}$		
Maximum Lead Temp. for Soldering Purposes, 1/8" from Case for 5 Seconds	T_L	275	°C

See the MTP8N45 Designer's Data Sheet for a complete set of design curves for the product on this data sheet.

The Designer's Data Sheet permits the design of most circuits entirely from the information presented. Limit curves — representing boundaries on device characteristics — are given to facilitate "worst case" design.



STYLE 5
PIN 1, GATE
2, DRAIN
3, SOURCE
4, DRAIN

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION, INCH.
 3. DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.68	12.28	0.380	0.485
C	4.07	4.82	0.160	0.190
D	0.84	0.98	0.033	0.039
F	3.61	3.73	0.142	0.147
G	2.42	2.66	0.095	0.106
H	2.80	2.93	0.110	0.116
J	0.96	0.95	0.038	0.037
K	12.70	14.27	0.500	0.562
L	1.15	1.29	0.045	0.051
N	4.83	5.33	0.190	0.210
O	2.54	3.04	0.100	0.120
A	2.04	2.79	0.080	0.110
S	1.15	1.29	0.045	0.051
T	5.97	6.47	0.235	0.255
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.54	—	0.100

CASE 221A-04
TO-220AB

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage (V _{GS} = 0, I _D = 0.25 mA)	IRF841, IRF843 IRF840, IRF842	V _{(BR)DSS}	450 500	— —	Vdc
Zero Gate Voltage Drain Current (V _{DS} = Rated V _{DSS} , V _{GS} = 0) (V _{DS} = 0.8 Rated V _{DSS} , V _{GS} = 0, T _J = 125°C)		I _{DSS}	— —	0.25 1.00	mAdc
Gate-Body Leakage Current, Forward (V _{GSF} = 20 Vdc, V _{DS} = 0)		I _{GSSF}	—	500	nAdc
Gate-Body Leakage Current, Reverse (V _{GSR} = 20 Vdc, V _{DS} = 0)		I _{GSSR}	—	500	nAdc
ON CHARACTERISTICS*					
Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 0.25 mA)		V _{GS(th)}	2.0	4.0	Vdc
Static Drain-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 4.0 Adc)	IRF840, IRF841 IRF842, IRF843	r _{DS(on)}	— —	0.85 1.0	Ohm
On-State Drain Current (V _{GS} = 10 V) (V _{DS} ≥ 6.8 Vdc) (V _{DS} ≥ 7.0 Vdc)	IRF840, IRF841 IRF842, IRF843	I _{D(on)}	8.0 7.0	— —	Adc
Forward Transconductance (V _{DS} ≥ 6.8 V, I _D = 4.0 A) (V _{DS} ≥ 7.0 V, I _D = 4.0 A)	IRF840, IRF841 IRF842, IRF843	g _{FS}	4.0 4.0	— —	mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	(V _{DS} = 25 V, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	—	1600	pF
Output Capacitance		C _{oss}	—	350	
Reverse Transfer Capacitance		C _{rss}	—	150	
SWITCHING CHARACTERISTICS*					
Turn-On Delay Time	(V _{DD} ≈ 200 V, I _D = 4.0 Apk, R _{gen} = 4.7 Ohms)	t _{d(on)}	—	35	ns
Rise Time		t _r	—	15	
Turn-Off Delay Time		t _{d(off)}	—	90	
Fall Time		t _f	—	30	
Total Gate Charge	(V _{GS} = 10 V, V _{DS} = 0.8 × Rated V _{DSS} , I _D = Rated I _D)	Q _g	40 (Typ)	60	nC
Gate-Source Charge		Q _{gs}	20 (Typ)	—	
Gate-Drain Charge		Q _{gd}	20 (Typ)	—	
SOURCE DRAIN DIODE CHARACTERISTICS*					
Forward On-Voltage	(I _S = Rated I _D , V _{GS} = 0)	V _{SD}	—	1.9 (1)	Vdc
Forward Turn-On Time		t _{on}	Limited by stray inductance		
Reverse Recovery Time		t _{rr}	600 (Typ)	—	ns
INTERNAL PACKAGE INDUCTANCE (TO-220)					
Internal Drain Inductance (Measured from the contact screw on tab to center of die) (Measured from the drain lead 0.25" from package to center of die)	L _d	3.5 (Typ) 4.5 (Typ)	— —	—	nH
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad)	L _s	7.5 (Typ)	—	—	

*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
 (1) Add 0.1 V for IRF840 and IRF841.