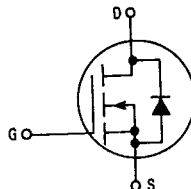


MOTOROLA SEMICONDUCTOR TECHNICAL DATA

Power Field Effect Transistor N-Channel Enhancement-Mode Silicon Gate TMOS

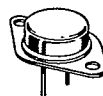
These TMOS Power FETs are designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- 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



**IRF240
IRF241
IRF243**

TMOS POWER FETs
16 and 18 AMPERES
 $r_{DS(on)} = 0.18 \text{ OHM}$
150 and 200 VOLTS
 $r_{DS(on)} = 0.22 \text{ OHMS}$
150 VOLTS



CASE 197A-02
TO-204AE

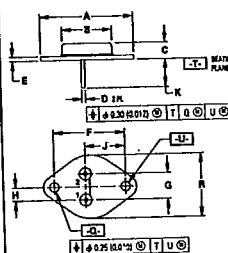
MAXIMUM RATINGS

Rating	Symbol	IRF			Unit
		240	241	243	
Drain-Source Voltage	V_{DS}	200	150	150	Vdc
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	200	150	150	Vdc
Gate-Source Voltage	V_{GS}	± 20			Vdc
Drain Current	I_D				Adc
Continuous, $T_C = 25^\circ\text{C}$		18		16	
$T_C = 200^\circ\text{C}$		11		10	
Peak, $T_C = 25^\circ\text{C}$		72		64	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	125 1			Watts W/°C
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150			°C

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case	$R_{\theta JC}$	1	°C/W
— Junction to Ambient	$R_{\theta JA}$	30	
Maximum Lead Temp. for Soldering Purposes, 1/8" from Case for 5 Seconds	T_L	300	°C

OUTLINE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION, INCH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	25.36	26.37	1.010	1.050
B	19.31	21.08	0.760	0.830
C	6.35	8.25	0.250	0.325
D	1.45	1.60	0.057	0.063
E	1.53	1.77	0.060	0.070
F	30.15 BSC		1.187 BSC	
G	10.92 BSC		0.430 BSC	
H	3.46 BSC		0.136 BSC	
J	16.83 BSC		0.663 BSC	
K	11.18	12.19	0.440	0.480
L	3.84	4.19	0.151	0.165
M	25.15	26.67	0.990	1.050
U	3.84	4.19	0.151	0.165

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 0.25$ mA)	IRF240 IRF241, IRF243	$V_{(BR)DSS}$	200 150	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = \text{Rated } V_{DSS}$, $V_{GS} = 0$) ($V_{DS} = 0.8 \text{ Rated } V_{DSS}$, $V_{GS} = 0$, $T_J = 125^\circ\text{C}$)		I_{DSS}	— —	0.2 1	mA _{dc}
Gate-Body Leakage Current, Forward ($V_{GSF} = 20$ Vdc, $V_{DS} = 0$)		I_{GSSF}	—	100	nA _{dc}
Gate-Body Leakage Current, Reverse ($V_{GSR} = 20$ Vdc, $V_{DS} = 0$)		I_{GSSR}	—	100	nA _{dc}

ON CHARACTERISTICS*

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 0.25$ mA)		$V_{GS(th)}$	2	4	Vdc
Static Drain-Source On-Resistance ($V_{GS} = 10$ Vdc, $I_D = 10$ A)	IRF240, IRF241 IRF243	$r_{DS(on)}$	— —	0.18 0.22	Ohm
On-State Drain Current ($V_{GS} = 10$ V) ($V_{DS} \geq 3.2$ Vdc) ($V_{DS} \geq 3.5$ Vdc)	IRF240, IRF241 IRF243	$I_{D(on)}$	18 16	— —	A _{dc}
Forward Transconductance ($V_{DS} \geq 3.2$ V, $I_D = 10$ A) ($V_{DS} \geq 3.5$ V, $I_D = 10$ A)	IRF240, IRF241 IRF243	g_{FS}	6 6	— —	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25$ V, $V_{GS} = 0$, $f = 1$ MHz)	C_{iss}	—	1600	pF
Output Capacitance		C_{oss}	—	750	
Reverse Transfer Capacitance		C_{rss}	—	300	

SWITCHING CHARACTERISTICS*

Turn-On Delay Time	$(V_{DD} = 75$ V, $I_D = 10$ Apk, $R_{gen} = 4.7$ Ohms)	$t_{d(on)}$	—	30	ns
Rise Time		t_r	—	60	
Turn-Off Delay Time		$t_{d(off)}$	—	80	
Fall Time		t_f	—	60	
Total Gate Charge	$(V_{DS} = 0.8 \text{ Rated } V_{DSS}$, $V_{GS} = 10$ Vdc, $I_D = \text{Rated } I_D)$	Q_g	38 (Typ)	60	nC
Gate-Source Charge		Q_{gs}	16 (Typ)	—	
Gate-Drain Charge		Q_{gd}	22 (Typ)	—	

SOURCE DRAIN DIODE CHARACTERISTICS*

Forward On-Voltage	$(I_S = \text{Rated } I_D$, $V_{GS} = 0)$	V_{SD}	1.8 (Typ)	1.9 ⁽¹⁾	Vdc
Forward Turn-On Time		t_{on}	Limited by stray inductance		
Reverse Recovery Time		t_{rr}	450 (Typ)	—	ns

INTERNAL PACKAGE INDUCTANCE

Internal Drain Inductance (Measured from the contact screw on the header closer to the source pin and the center of the die)	L_d	5 (Typ)	—	nH
Internal Source Inductance (Measured from the source pin, 0.25" from the package to the source bond pad)	L_s	12.5 (Typ)	—	nH

*Pulse Test: Pulse Width ≤ 300 μ s, Duty Cycle $\leq 2\%$.

(1) Add 0.1 V for IRF240 and IRF241.