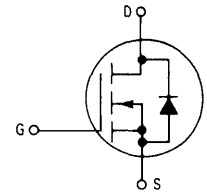
IRF140
IRF141
IRF142

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

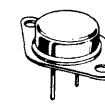
These TMOS Power FETs are designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- 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

TMOS™



TMOS POWER FETs
24 and 27 AMPERES
$r_{DS(on)}$ = 0.085 OHM
60 and 100 VOLTS
$r_{DS(on)}$ = 0.11 OHMS
100 VOLTS



CASE 197A-02
TO-204AE

3

MAXIMUM RATINGS

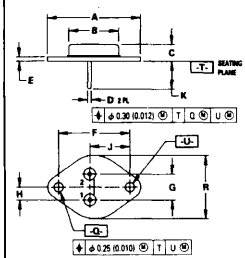
Rating	Symbol	IRF 140	IRF 141	IRF 142	Unit
Drain-Source Voltage	V_{DSS}	100	60	100	Vdc
Drain-Gate Voltage (R_{GS} = 20 kΩ)	V_{DGR}	100	60	100	Vdc
Gate-Source Voltage	V_{GS}	±20			Vdc
Drain Current Continuous, T_C = 25°C T_C = 100°C Peak, T_C = 25°C	I_D	27 17 108		24 15 96	Adc
Total Power Dissipation @ T_C = 25°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 — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	1 30	°C/W
Maximum Lead Temp. for Soldering Purposes, 1/8" from Case for 5 Seconds	T_L	300	°C

See the MTM25N10 Designer's Data Sheet for a complete set of design curves for the product on this data sheet.

OUTLINE DIMENSIONS



STYLE 3:
PIN 1. GATE
2. SOURCE
CASE. DRAIN

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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	38.36	39.37	1.510	1.550
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	5.46 BSC		0.215 BSC	
J	16.89 BSC		0.665 BSC	
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	25.15	26.67	0.990	1.050
U	3.84	4.19	0.151	0.165

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)	IRF140, IRF142 IRF141	$V_{(BR)DSS}$	 100 60	 — —	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}	 — —	 0.2 1	mAdc
Gate-Body Leakage Current, Forward (V_{GSF} = 20 Vdc, V_{DS} = 0)		I_{GSSF}	—	100	nAdc
Gate-Body Leakage Current, Reverse (V_{GSR} = 20 Vdc, V_{DS} = 0)		I_{GSSR}	—	100	nAdc
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 = 15 Adc)	IRF140, IRF141 IRF142	$r_{DS(on)}$	 — —	 0.085 0.11	Ohm
On-State Drain Current (V_{GS} = 10 V) (V_{DS} ≥ 2.3 Vdc) (V_{DS} ≥ 2.6 Vdc)	 IRF140, IRF141 IRF142	$I_{D(on)}$	 27 24	 — —	Adc
Forward Transconductance (V_{DS} ≥ 2.3 V, I_D = 15 A) (V_{DS} ≥ 2.6 V, I_D = 15 A)	 IRF140, IRF141 IRF142	g_{FS}	 6.0 6.0	 — —	mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0, f = 1 MHz)	C_{iss}	—	1600	pF
Output Capacitance		C_{oss}	—	800	
Reverse Transfer Capacitance		C_{rss}	—	300	
SWITCHING CHARACTERISTICS*					
Turn-On Delay Time	(V_{DD} ≈ 30 V, I_D = 15 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	—	30	
Total Gate Charge	(V_{DS} = 0.8 Rated V_{DSS}, V_{GS} = 10 Vdc, I_D = Rated I_D)	Q_g	40 (Typ)	60	nC
Gate-Source Charge		Q_{gs}	17 (Typ)	—	
Gate-Drain Charge		Q_{gd}	23 (Typ)	—	
SOURCE DRAIN DIODE CHARACTERISTICS*					
Forward On-Voltage	(I_S = Rated I_D, V_{GS} = 0)	V_{SD}	1.5 (Typ)	2.3(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 μs, Duty Cycle ≤ 2%.
(1) Add 0.2 V for IRF140 and IRF141.