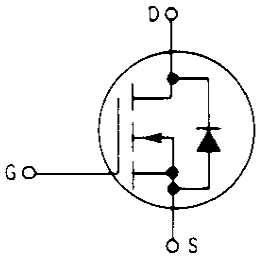
IRF640

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

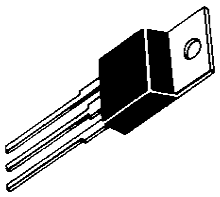
This TMOS Power FET is designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- 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 FET
18 AMPERES
$R_{DS(on)}$ = 0.18 OHM
200 VOLTS



CASE 221A-06
(TO-220AB)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	200	Vdc
Drain-Gate Voltage (R_{GS} = 20 kΩ)	V_{DGR}	200	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	 18 11 72	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 62.5	°C/W
Maximum Lead Temp. for Soldering Purposes, 1/8″ from Case for 10 Seconds	T_L	260	°C

See the MTP20N20E Designer's Data Sheet for a complete set of design curves for the product on this data sheet.

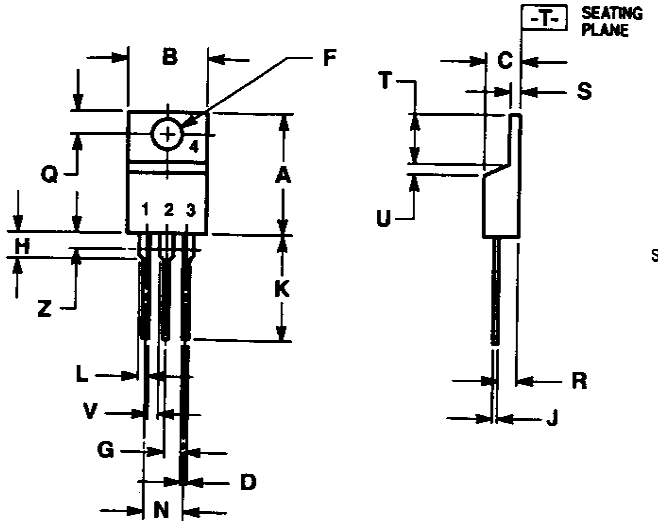
REV 1

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)	$V_{(BR)DSS}$	200	—	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 = 10 Adc)	$R_{DS(on)}$	—	0.18	Ohm
On-State Drain Current (V_{GS} = 10 V) (V_{DS} ≥ 3.2 Vdc)	$I_{D(on)}$	18	—	Adc
Forward Transconductance (V_{DS} ≥ 3.2 V, I_D = 10 A)	g_{FS}	6	—	mhos
DYNAMIC CHARACTERISTICS				
Input Capacitance	C_{iss}	—	1600	pF
Output Capacitance	C_{oss}	—	750	
Reverse Transfer Capacitance	C_{rss}	—	300	
SWITCHING CHARACTERISTICS*				
Turn-On Delay Time	$t_{d(on)}$	—	30	ns
Rise Time	t_r	—	60	
Turn-Off Delay Time	$t_{d(off)}$	—	80	
Fall Time	t_f	—	60	
Total Gate Charge	Q_g	36 (Typ)	60	nC
Gate-Source Charge	Q_{gs}	16 (Typ)	—	
Gate-Drain Charge	Q_{gd}	22 (Typ)	—	
SOURCE DRAIN DIODE CHARACTERISTICS*				
Forward On-Voltage	V_{SD}	1.8 (Typ)	2.0	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 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%.

PACKAGE OUTLINE DIMENSIONS AND FOOTPRINTS (continued)

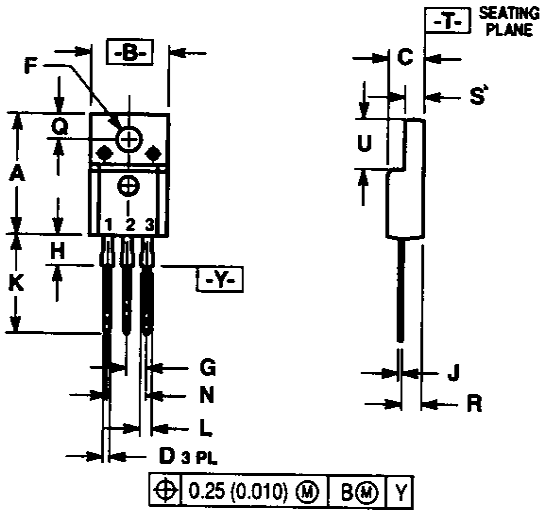


STYLE 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	—	1.15	—
Z	—	0.080	—	2.04

CASE 221A–06
(TO–220AB)
ISSUE Y



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

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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.621	0.629	15.78	15.97
B	0.394	0.402	10.01	10.21
C	0.181	0.189	4.60	4.80
D	0.026	0.034	0.67	0.86
F	0.121	0.129	3.08	3.27
G	0.100 BSC		2.54 BSC	
H	0.123	0.129	3.13	3.27
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.14	1.52
N	0.200 BSC		5.08 BSC	
Q	0.126	0.134	3.21	3.40
R	0.107	0.111	2.72	2.81
S	0.096	0.104	2.44	2.64
U	0.259	0.267	6.58	6.78

CASE 221D–02
(ISOLATE TO–220 TYPE)
ISSUE D

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