MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

7-39-13

IRFZ40
IRFZ42

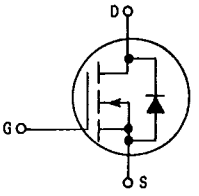
Power Field Effect Transistors
N-Channel Enhancement-Mode Silicon Gate TMOS

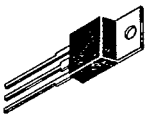
These TMOS Power FETs are designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

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

TMOS™

TMOS POWER FETs
46 and 51 AMPERES
$r_{DS(on)}$ = 0.028 OHM
50 VOLTS
$r_{DS(on)}$ = 0.035 OHM





CASE 221A-04
TO-220AB

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MAXIMUM RATINGS

Rating	Symbol	Device		Unit
		IRFZ40	IRFZ42	
Drain-Source Voltage	V_{DSS}	50		Vdc
Drain-Gate Voltage (R_{GS} = 1 MΩ)	V_{DGR}	50		Vdc
Gate-Source Voltage	V_{GS}	±20		Vdc
Drain Current — Continuous @ T_C = 25°C — Continuous @ T_C = 100°C — Pulsed @ T_C = 25°C	I_D I_{DM}	51 32 160	46 29 145	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}	−65 to 150		°C

THERMAL CHARACTERISTICS

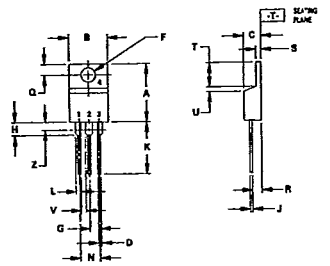
Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	1 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from Case for 5 Seconds	T_L	300	°C

See the MTP50N05E Designer's Data Sheet for a complete set of design curves for these devices.

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)		$V_{(BR)DSS}$	50	—	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 = 29 Adc)	IRFZ40 IRFZ42	$r_{DS(on)}$	— —	0.028 0.035	Ohm
On-State Drain Current (V_{GS} = 10 V) (V_{DS} ≥ 1.4 Vdc) (V_{DS} ≥ 1.6 Vdc)	IRFZ40 IRFZ42	$I_{D(on)}$	51 45	— —	Adc
Forward Transconductance (V_{DS} ≥ 1.4 V, I_D = 29 A) (V_{DS} ≥ 1.6 V, I_D = 29 A)	IRFZ40 IRFZ42	g_{FS}	17 17	— —	mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0, f = 1 MHz)	C_{iss}	—	3000	pF
Output Capacitance		C_{oss}	—	1200	
Reverse Transfer Capacitance		C_{rss}	—	400	
SWITCHING CHARACTERISTICS*					
Turn-On Delay Time	(V_{DD} ≈ 25 V, I_D = 29 Apk, R_{gen} = Ohms)	$t_{d(on)}$	—	25	ns
Rise Time		t_r	—	60	
Turn-Off Delay Time		$t_{d(off)}$	—	70	
Fall Time		t_f	—	25	
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}	22 (Typ)	—	
Gate-Drain Charge		Q_{gd}	18 (Typ)	—	
SOURCE-DRAIN DIODE CHARACTERISTICS*					
Forward On-Voltage	(I_S = Rated I_D, V_{GS} = 0)	V_{SD}	1.3 (Typ)	2.2(1)	Vdc
Forward Turn-On Time		t_{on}	Limited by stray inductance		
Reverse Recovery Time		t_{rr}	350 (Typ)	—	ns

*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
(1) Add 0.3 V for IRFZ40.



CASE 221A-04
TO-220AB

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 MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	14.48	15.75	0.570	0.620
B	9.65	10.28	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.88	0.025	0.035
F	3.61	3.73	0.142	0.147
G	2.42	2.66	0.095	0.105
H	2.80	2.93	0.110	0.115
J	0.38	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.79	0.080	0.110
S	1.15	1.39	0.045	0.055
T	5.97	6.47	0.235	0.255
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.04	—	0.080