

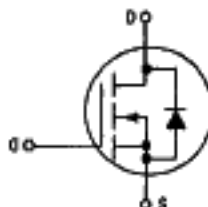
Power Field Effect Transistors

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



IRFZ40
IRFZ42

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



CASE 221A-04
 TO-220AB

MAXIMUM RATINGS

Rating	Symbol	Device		Unit
		IRFZ40	IRFZ42	
Drain-Source Voltage	V_{DS}	50		Vdc
Drain-Gate Voltage ($R_{GS} = 1 \text{ M}\Omega$)	V_{DGR}	50		Vdc
Gate-Source Voltage	V_{GS}	± 20		Vdc
Drain Current — Continuous @ $T_C = 25^\circ\text{C}$	I_D	51	46	Adc
— Continuous @ $T_C = 100^\circ\text{C}$		32	29	
— Pulsed @ $T_C = 25^\circ\text{C}$	I_{DM}	160	145	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	125		Watts
Derate above 25°C		1		W/°C
Operating and Storage Temperature Range	T_J, T_{stg}	-65 to 150		°C

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case	$R_{\theta JC}$	1	°C/W
— Junction to Ambient	$R_{\theta JA}$	62.5	
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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Drain-Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 0.25\text{ mA}$)	$V_{(BR)DSS}$	50	—	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	mAdc
Gate-Body Leakage Current, Forward ($V_{GSF} = 20\text{ Vdc}$, $V_{DS} = 0$)	I_{GSSF}	—	100	nAdc
Gate-Body Leakage Current, Reverse ($V_{GSR} = 20\text{ Vdc}$, $V_{DS} = 0$)	I_{GSR}	—	100	nAdc

ON CHARACTERISTICS*

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 0.25\text{ mA}$)	$V_{GS(th)}$	2	4	Vdc
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 29\text{ Adc}$)	$r_{DS(on)}$	—	0.028 0.035	Ω
On-State Drain Current ($V_{GS} = 10\text{ V}$) ($V_{DS} \geq 1.4\text{ Vdc}$) ($V_{DS} \geq 1.6\text{ Vdc}$)	$I_{D(on)}$	51 45	—	Adc
Forward Transconductance ($V_{DS} \geq 1.4\text{ V}$, $I_D = 29\text{ A}$) ($V_{DS} \geq 1.6\text{ V}$, $I_D = 29\text{ A}$)	g_{FS}	17 17	—	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ V, } V_{GS} = 0, f = 1\text{ MHz})$	C_{iss}	—	3000	μF
Output Capacitance		C_{oss}	—	1200	
Reverse Transfer Capacitance		C_{rss}	—	400	

SWITCHING CHARACTERISTICS*

Turn-On Delay Time	$(V_{DD} = 25\text{ V, } I_D = 29\text{ Apk, } R_{gen} = 0\Omega)$	$t_{d(on)}$	—	25	ns
Rise Time		t_r	—	60	
Turn-Off Delay Time		$t_{d(off)}$	—	70	
Fall Time		t_f	—	25	
Total Gate Charge	$(V_{DS} = 0.8 \text{ Rated } V_{DSS}, V_{GS} = 10\text{ Vdc, } I_D = \text{Rated } I_D)$	Q_g	40 (Typ)	60	nC
Gate-Source Charge		Q_{gs}	22 (Typ)	—	
Gate-Drain Charge		Q_{gd}	18 (Typ)	—	

SOURCE-DRAIN DIODE CHARACTERISTICS*

SOURCE-DRAIN DIODE CHARACTERISTICS*					
Forward On-Voltage	$(I_S = \text{Rated } I_D, V_{GS} = 0)$	V_{SD}	1.3 (Typ)	2.2 ⁽¹⁾	V_{dc}
Forward Turn-On Time		t_{on}	Limited by stray inductance		
Reverse Recovery Time		t_{rr}	350 (Typ)	—	ns

*Pulse Test: Pulse Width $< 300\text{ }\mu\text{s}$, Duty Cycle $< 2\%$.

(1) Add 0.3 V for IRFZ40.

**CASE 221A-M
TO-220AB**

STYLES
PMT CASE
1. DRAIN
2. GATE
3. SOURCE

NOTES

1. DIMENSIONS ARE MILLIMETERS AND INCHES.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE IN MILLIMETERS AND INCHES.

TYPICAL CHARACTERISTICS		TYPICAL CHARACTERISTICS	
TEMPERATURE	PARAMETER	TEMPERATURE	PARAMETER
-55 to 125	$r_{DS(on)}$	-55 to 125	$r_{DS(on)}$
	$r_{DS(on)}$		$r_{DS(on)}$
-55 to 125	$I_{D(on)}$	-55 to 125	$I_{D(on)}$
	$I_{D(on)}$		$I_{D(on)}$
-55 to 125	g_{FS}	-55 to 125	g_{FS}
	g_{FS}		g_{FS}
-55 to 125	C_{iss}	-55 to 125	C_{iss}
	C_{iss}		C_{iss}
-55 to 125	C_{oss}	-55 to 125	C_{oss}
	C_{oss}		C_{oss}
-55 to 125	C_{rss}	-55 to 125	C_{rss}
	C_{rss}		C_{rss}
-55 to 125	$t_{d(on)}$	-55 to 125	$t_{d(on)}$
	$t_{d(on)}$		$t_{d(on)}$
-55 to 125	t_r	-55 to 125	t_r
	t_r		t_r
-55 to 125	$t_{d(off)}$	-55 to 125	$t_{d(off)}$
	$t_{d(off)}$		$t_{d(off)}$
-55 to 125	t_f	-55 to 125	t_f
	t_f		t_f
-55 to 125	Q_g	-55 to 125	Q_g
	Q_g		Q_g
-55 to 125	Q_{gs}	-55 to 125	Q_{gs}
	Q_{gs}		Q_{gs}
-55 to 125	Q_{gd}	-55 to 125	Q_{gd}
	Q_{gd}		Q_{gd}