

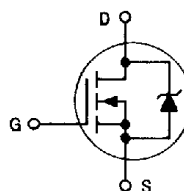
MOTOROLA SEMICONDUCTOR TECHNICAL DATA

Advance Information

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

This advanced TMOS E-FET is designed to withstand high energy in the avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional safety margin against unexpected voltage transients.

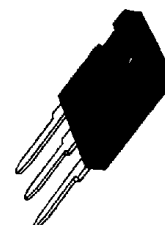
- Avalanche Energy Specified
- Source-to-Drain Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature



MTW10N40E

Motorola Preferred Device

TMOS POWER FET
10 AMPERES
 $R_{DS(on)} = 0.55 \text{ OHM}$
400 VOLTS



CASE 340F-03
TO-247AE

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	400	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$)	V_{DGR}	400	Vdc
Gate-Source Voltage — Continuous	V_{GS}	± 20	Vdc
Drain Current — Continuous @ $T_C = 25^\circ\text{C}$	I_D	10	Adc
— Continuous @ $T_C = 100^\circ\text{C}$	I_D	7.0	
— Single Pulse ($t_p \leq 10 \mu\text{s}$)	I_{DM}	40	Apk
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	150	Watts
Derate above 25°C		1.0	W/ $^\circ\text{C}$
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy — Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 50 \text{ Vdc}$, $V_{GS} = 10 \text{ Vpk}$, $I_L = 10 \text{ Apk}$, $L = 10.4 \text{ mH}$, $R_G = 25 \Omega$)	EAS	520	mJ
Thermal Resistance — Junction to Case	$R_{\theta JC}$	1.0	$^\circ\text{C/W}$
— Junction to Ambient	$R_{\theta JA}$	40	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C}$

This document contains information on a new product. Specifications and information are subject to change without notice.

E-FET is a trademark of Motorola Inc.

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Preferred devices are Motorola recommended choices for future use and best overall value.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V _{GS} = 0 V, I _D = 250 μAdc) Temperature Coefficient (Positive)	BV _{DSS}	400	— 360	—	Vdc mV/°C
Zero Gate Voltage Drain Current (V _{DS} = 400 Vdc, V _{GS} = 0) (V _{DS} = 400 Vdc, V _{GS} = 0, T _J = 125°C)	I _{DSS}	—	—	250 1000	μAdc
Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0)	I _{GSS}	—	—	100	nAdc

ON CHARACTERISTICS*

Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 μAdc) Temperature Coefficient (Negative)	V _{GS(th)}	2.0	— 5.0	4.0	Vdc mV/°C
Static Drain-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 5.0 Adc)	R _{DS(on)}	—	—	0.55	Ohm
Drain-Source On-Voltage (V _{GS} = 10 Vdc) (I _D = 10 Adc) (I _D = 5.0 Adc, T _J = 125°C)	V _{DS(on)}	—	—	6.6 5.5	Vpk
Forward Transconductance (V _{DS} = 50 Vdc, I _D = 5.0 Adc)	g _{FS}	4.0	—	—	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = 25 Vdc, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	—	1570	2355	pF
Output Capacitance		C _{oss}	—	230	345	
Reverse Transfer Capacitance		C _{rss}	—	55	83	

SWITCHING CHARACTERISTICS*†

Turn-On Delay Time	(V _{DD} = 200 Vdc, I _D = 10 Adc, V _{GS} = 10 Vdc, R _g = 9.1 Ω)	t _{d(on)}	—	25	50	ns
Rise Time		t _r	—	37	75	
Turn-Off Delay Time		t _{d(off)}	—	75	150	
Fall Time		t _f	—	31	65	
Gate Charge	(V _{DS} = 320 Vdc, I _D = 10 Adc, V _{GS} = 10 Vdc)	Q _T	—	75	110	nC
		Q ₁	—	14	—	
		Q ₂	—	41	—	
		Q ₃	—	30	—	

SOURCE-DRAIN DIODE CHARACTERISTICS*

Forward On-Voltage	(I _S = 10 Adc, V _{GS} = 0) (I _S = 10 Adc, V _{GS} = 0, T _J = 125°C)	V _{SD}	—	1.3 1.2	2.0	Vdc
Reverse Recovery Time	(I _S = 10 Adc, V _{GS} = 0, di _S /dt = 100 A/μs)	t _{rr}	—	330	—	ns
		t _a	—	220	—	
		t _b	—	110	—	
Reverse Recovery Stored Charge		Q _{RR}	—	4.3	—	μC

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	—	5.0	—	nH
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad)	L _S	—	13	—	nH

*Pulse Test Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%

† Switching characteristics are independent of operating junction temperature.