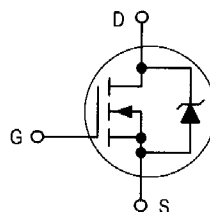


TMOS E-FET™ High Energy Power FET N-Channel Enhancement-Mode Silicon Gate

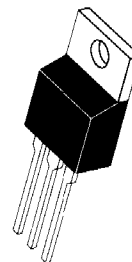
This advanced high voltage TMOS E-FET is designed to withstand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode with fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, PWM motor controls and other inductive loads, the avalanche energy capability is specified to eliminate the guesswork in designs where inductive loads are switched and offer additional safety margin against unexpected voltage transients.

- Avalanche Energy Capability Specified at Elevated Temperature
- Low Stored Gate Charge for Efficient Switching
- Internal Source-to-Drain Diode Designed to Replace External Zener Transient Suppressor — Absorbs High Energy in the Avalanche Mode
- Source-to-Drain Diode Recovery Time Comparable to Discrete Fast Recovery Diode



MTP5N40E

TMOS POWER FET
5.0 AMPERES
400 VOLTS
RDS(on) = 1.0 OHM



TO-220AB

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	400	Vdc
Drain-Gate Voltage (R _{GS} = 1.0 MΩ)	V _{DGR}	400	Vdc
Gate-Source Voltage — Continuous	V _{GSM}	±20	Vdc
— Non-repetitive	V _{GSM}	±40	Vpk
Drain Current — Continuous	I _D	5.0	Adc
— Pulsed	I _{DM}	12	
Total Power Dissipation @ T _C = 25°C	P _D	75	Watts
Derate above 25°C		0.6	W/°C
Operating and Storage Temperature Range	T _J , T _{stg}	-55 to 150	°C

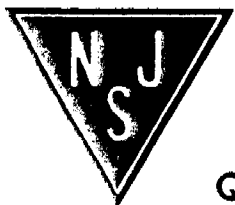
UNCLAMPED DRAIN-TO-SOURCE AVALANCHE CHARACTERISTICS (T_J < 150°C)

Single Pulse Drain-to-Source Avalanche Energy — T _J = 25°C	W _{DSR} (1)	290	mJ
— T _J = 100°C		46	
Repetitive Pulse Drain-to-Source Avalanche Energy	W _{DSR} (2)	7.4	

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case	R _{θJC}	1.67	°C/W
— Junction to Ambient	R _{θJA}	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T _L	260	°C

NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.



MTP5N40E

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

Characteristic	Symbol	Min	Typ	Max	Unit	
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage (V _{GS} = 0, I _D = 250 μAdc)	V _{(BR)DSS}	400	—	—	Vdc	
Zero Gate Voltage Drain Current (V _{DS} = 400 V, V _{GS} = 0) (V _{DS} = 320 V, V _{GS} = 0, T _J = 125°C)	I _{DSS}	— —	— —	0.25 1.0	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 = 250 μAdc) (T _J = 125°C)	V _{GS(th)}	2.0 1.5	— —	4.0 3.5	Vdc	
Static Drain-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 2.5 Adc)	R _{DS(on)}	—	0.8	1.0	Ohm	
Drain-Source On-Voltage (V _{GS} = 10 Vdc) (I _D = 5.0 A) (I _D = 2.5 A, T _J = 100°C)	V _{DS(on)}	— —	— —	6.2 5.0	Vdc	
Forward Transconductance (V _{DS} = 15 Vdc, I _D = 2.5 Adc)	g _{FS}	2.0	—	—	mhos	
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V _{DS} = 25 V, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	—	775	pF	
Output Capacitance		C _{oss}	—	96		
Transfer Capacitance		C _{rss}	—	22		
SWITCHING CHARACTERISTICS*						
Turn-On Delay Time	(V _{DD} = 250 V, I _D = 5.0 A, R _G = 12 Ω, R _L = 50 Ω, V _{GS(on)} = 10 V)	t _{d(on)}	—	24	ns	
Rise Time		t _r	—	34		
Turn-Off Delay Time		t _{d(off)}	—	60		
Fall Time		t _f	—	36		
Total Gate Charge	(V _{DS} = 320 V, I _D = 5.0 A, V _{GS} = 10 V)	Q _g	—	27	nC	
Gate-Source Charge		Q _{gs}	—	3.5		
Gate-Drain Charge		Q _{gd}	—	14		
SOURCE-DRAIN DIODE CHARACTERISTICS*						
Forward On-Voltage	(I _S = 5.0 A, di/dt = 100 A/μs)	V _{SD}	—	—	1.4	Vdc
Forward Turn-On Time		t _{on}	**			ns
Reverse Recovery Time		t _{rr}	—	—	660	
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	—	nH	
		—	4.5	—		
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad)	L _s	—	7.5	—	nH	

* Indicates Pulse Test: Pulse Width = 300 μs Max, Duty Cycle ≤ 2.0%.

** Limited by circuit inductance.