

Product Preview

TMOS E-FET™

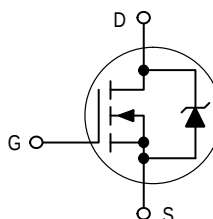
High Energy Power FET

D2PAK for Surface Mount

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.

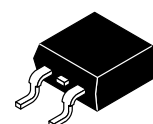
- Avalanche Energy Capability Specified at Elevated Temperature
- Low Stored Gate Charge for Efficient Switching
- Internal Source-to-Drain Diode Designed to Replace External Zener Transient Suppressor — Absorbs High Energy in the Avalanche Mode
- Source-to-Drain Diode Recovery Time Comparable to Discrete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



MTB3N60E

Motorola Preferred Device

TMOS POWER FET
3.0 AMPERES
600 VOLTS
R_{DS(on)} = 2.2 OHMS



CASE 418B-03, Style 2
D2PAK

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

Rating	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	600	Vdc
Drain-Gate Voltage (R _{GS} = 1.0 MΩ)	V _{DGR}	600	Vdc
Gate-Source Voltage — Continuous	V _{GS}	±20	Vdc
— Non-repetitive	V _{GSM}	±40	Vpk
Drain Current — Continuous	I _D	3.0	Adc
— Continuous @ 100°C	I _D	2.4	
— Pulsed	I _{DM}	14	
Total Power Dissipation @ T _C = 25°C	P _D	75	Watts
Derate above 25°C		0.6	W/°C
Total Power Dissipation @ T _A = 25°C ⁽¹⁾		2.5	Watts
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} ⁽²⁾	290	mJ
— T _J = 100°C		46	
Repetitive Pulse Drain-to-Source Avalanche Energy	W _{DSR} ⁽³⁾	7.5	

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case	R _{θJC}	1.67	°C/W
— Junction to Ambient	R _{θJA}	62.5	
— Junction to Ambient ⁽¹⁾	R _{θJA}	50	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T _L	260	°C

(1) When surface mounted to an FR-4 board using the minimum recommended pad size

(2) V_{DD} = 50 V, I_D = 3.0 A

(3) Pulse Width and frequency is limited by T_{J(max)} and thermal response

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

E-FET and Designer's are trademarks of Motorola, Inc. TMOS is a registered trademark of Motorola, Inc.

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

MTB3N60E

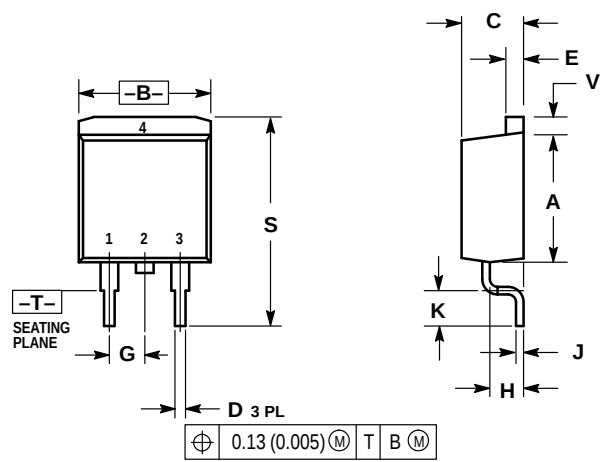
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit	
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage (V _{GS} = 0, I _D = 250 μAdc)	V _{(BR)DSS}	600	—	—	Vdc	
Zero Gate Voltage Drain Current (V _{DS} = 600 V, V _{GS} = 0) (V _{DS} = 480 V, V _{GS} = 0, T _J = 125°C)	I _{DSS}	— —	— —	10 100	μAdc	
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-to-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 1.5 A)	R _{DS(on)}	—	2.1	2.2	Ohms	
Drain-to-Source On-Voltage (V _{GS} = 10 Vdc) (I _D = 3.0 A) (I _D = 1.5 A, T _J = 100°C)	V _{DS(on)}	— —	— —	9.0 7.5	Vdc	
Forward Transconductance (V _{DS} = 15 Vdc, I _D = 1.5 A)	g _{FS}	1.5	—	—	mhos	
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V _{DS} = 25 V, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	—	770	pF	
Output Capacitance		C _{oss}	—	105		
Transfer Capacitance		C _{rss}	—	19		
SWITCHING CHARACTERISTICS*						
Turn-On Delay Time	(V _{DD} = 300 V, I _D ≈ 3.0 A, R _L = 100 Ω, R _G = 12 Ω, V _{GS(on)} = 10 V)	t _{d(on)}	—	23	ns	
Rise Time		t _r	—	34		
Turn-Off Delay Time		t _{d(off)}	—	58		
Fall Time		t _f	—	35		
Total Gate Charge	(V _{DS} = 420 V, I _D = 3.0 A, V _{GS} = 10 V)	Q _g	—	28	nC	
Gate-Source Charge		Q _{gs}	—	5.0		
Gate-Drain Charge		Q _{gd}	—	17		
SOURCE-DrAIN DIODE CHARACTERISTICS						
Forward On-Voltage	(I _S = 3.0 A, di/dt = 100 A/μs)	V _{SD}	—	—	1.4	Vdc
Forward Turn-On Time		t _{on}	—	**	—	ns
Reverse Recovery Time		t _{rr}	—	400	—	
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 4.5	— —	nH	
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad)	L _s	—	7.5	—		

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

** Limited by circuit inductance.

PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

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

CASE 418B-03
ISSUE C

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Nippon Motorola Ltd.: SPD, Strategic Planning Office, 4-32-1,
Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan. 81-3-5487-8488

Customer Focus Center: 1-800-521-6274

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609
Motorola Fax Back System – US & Canada ONLY 1-800-774-1848
– <http://sps.motorola.com/mfax/>

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

HOME PAGE: <http://motorola.com/sps/>

**MOTOROLA**