

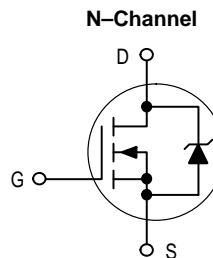
Product Preview

TMOS E-FET™

Power Field Effect Transistor
N-Channel Enhancement-Mode Silicon Gate

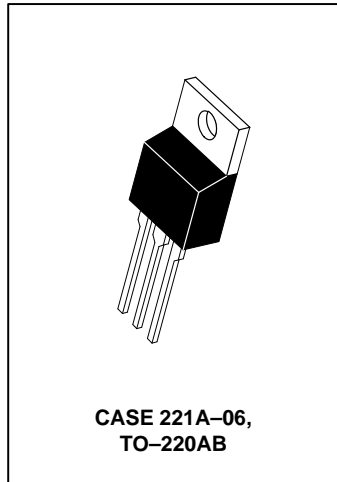
This advanced TMOS E-FET is designed to withstand high energy in the avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for low voltage, high speed switching applications in power supplies, converters and PWM motor 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 Diode 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



MTP29N15E

TMOS POWER FET
29 AMPERES
150 VOLTS
 $R_{DS(on)} = 0.07 \text{ OHM}$



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

| Rating | Symbol | Value | Unit |
|---|-----------------|------------|---------------------------|
| Drain-to-Source Voltage | V_{DSS} | 150 | Vdc |
| Drain-to-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$) | V_{DGR} | 150 | Vdc |
| Gate-to-Source Voltage — Continuous | V_{GS} | ± 20 | Vdc |
| — Non-Repetitive ($t_p \leq 10 \text{ ms}$) | V_{GSM} | ± 40 | Vpk |
| Drain Current — Continuous | I_D | 29 | Adc |
| — Continuous @ 100°C | I_D | 19 | |
| — Single Pulse ($t_p \leq 10 \mu\text{s}$) | I_{DM} | 102 | Apk |
| Total Power Dissipation | P_D | 125 | Watts |
| Derate above 25°C | | 1.0 | $\text{W}/^\circ\text{C}$ |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to 150 | $^\circ\text{C}$ |
| Single Pulse Drain-to-Source Avalanche Energy — STARTING $T_J = 25^\circ\text{C}$ ($V_{DD} = 25 \text{ Vdc}$, $V_{GS} = 10 \text{ Vdc}$, PEAK $I_L = 29 \text{ Apk}$, $L = 1.0 \text{ mH}$, $R_G = 25 \Omega$) | E_{AS} | 421 | mJ |
| Thermal Resistance — Junction to Case | $R_{\theta JC}$ | 1.0 | $^\circ\text{C}/\text{W}$ |
| — Junction to Ambient | $R_{\theta JA}$ | 62.5 | |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

E-FET is a trademark of Motorola, Inc. TMOS is a registered trademark of Motorola, Inc.

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

MTP29N15E

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|----------------------|----------|----------|-----------|--------------|
| Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 0.25 mAdc) Temperature Coefficient (Positive) | V _{(BR)DSS} | 150 — | — TBD | — — | Vdc mV/°C |
| Zero Gate Voltage Drain Current (V _{DS} = 150 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 150 Vdc, V _{GS} = 0 Vdc, T _J = 125°C) | I _{DSS} | — — | — — | 10 100 | μAdc |
| Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0 Vdc) | I _{GSS} | — | — | 100 | nAdc |

ON CHARACTERISTICS (1)

| | | | | | |
|--|---------------------|----------|------------|------------|--------------|
| Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 μAdc) Threshold Temperature Coefficient (Negative) | V _{GS(th)} | 2.0 — | 2.7 TBD | 4.0 — | Vdc mV/°C |
| Static Drain-to-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 14.5 Adc) | R _{DS(on)} | — | 0.055 | 0.07 | Ohms |
| Drain-to-Source On-Voltage (V _{GS} = 10 Vdc, I _D = 29 Adc) (V _{GS} = 10 Vdc, I _D = 14.5 Adc, T _J = 125°C) | V _{DS(on)} | — — | — — | 2.4 2.1 | Vdc |
| Forward Transconductance (V _{DS} = 8.6 Vdc, I _D = 14.5 Adc) | g _{FS} | 10 | 18 | — | mhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|----------------------|---|------------------|---|------|------|----|
| Input Capacitance | (V _{DS} = 25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz) | C _{iss} | — | 2250 | 3150 | pF |
| Output Capacitance | | C _{oss} | — | 455 | 910 | |
| Transfer Capacitance | | C _{rss} | — | 133 | 190 | |

SWITCHING CHARACTERISTICS (2)

| | | | | | | |
|---------------------|---|---------------------|---|------|-----|----|
| Turn-On Delay Time | (V _{DD} = 75 Vdc, I _D = 29 Adc, V _{GS} = 10 Vdc, R _G = 9.1 Ω) | t _{d(on)} | — | 17.5 | 40 | ns |
| Rise Time | | t _r | — | 108 | 220 | |
| Turn-Off Delay Time | | t _{d(off)} | — | 90 | 180 | |
| Fall Time | | t _f | — | 85 | 170 | |
| Gate Charge | (V _{DS} = 120 Vdc, I _D = 29 Adc, V _{GS} = 10 Vdc) | Q _T | — | 78 | 110 | nC |
| | | Q ₁ | — | 12 | — | |
| | | Q ₂ | — | 37 | — | |
| | | Q ₃ | — | 23 | — | |

SOURCE-DRAIN DIODE CHARACTERISTICS

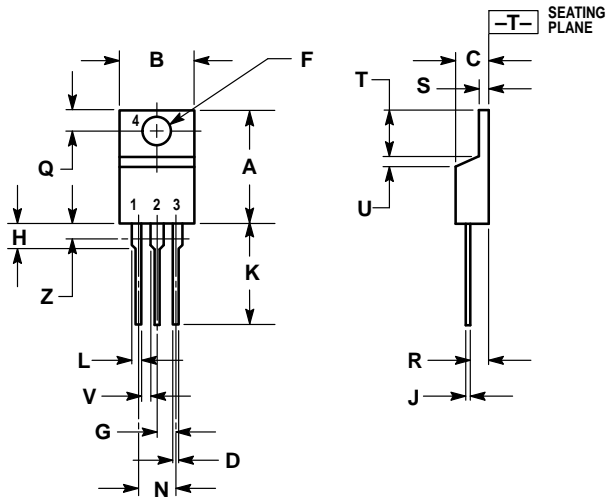
| | | | | | | |
|--|---|-----------------|-------------|----------|-----|----|
| Forward On-Voltage (I _S = 29 Adc, V _{GS} = 0 Vdc) (I _S = 29 Adc, V _{GS} = 0 Vdc, T _J = 125°C) | V _{SD} | — — | 0.92 TBD | 1.3 — | Vdc | |
| Reverse Recovery Time | (I _S = 29 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/μs) | t _{rr} | — | 174 | — | ns |
| | | t _a | — | 140 | — | |
| | | t _b | — | 34 | — | |
| Reverse Recovery Stored Charge | Q _{RR} | — | 1.4 | — | μC | |

INTERNAL PACKAGE INDUCTANCE

| | | | | | |
|--|----------------|--------|------------|--------|----|
| Internal Drain Inductance (Measured from 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 | — | |

- (1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
- (2) Switching characteristics are independent of operating junction temperature.


PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.147 | 3.61 | 3.73 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | — | 1.15 | — |
| Z | — | 0.080 | — | 2.04 |

CASE 221A-06
ISSUE Y

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

