Product Preview

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

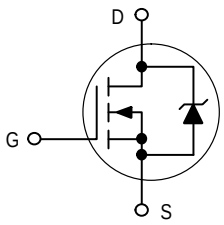
MTP29N15E

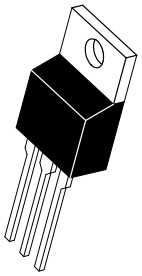
TMOS POWER FET
29 AMPERES
150 VOLTS
$R_{DS(on)}$ = 0.07 OHM

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

N–Channel





CASE 221A–06,
TO–220AB

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

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

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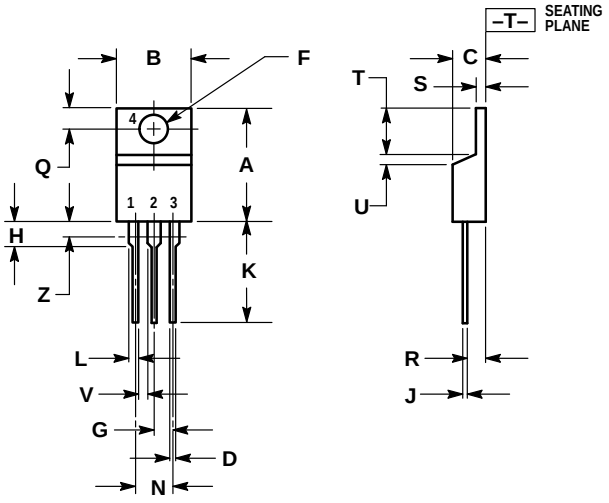
This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

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 Vdc, I_D = 0.25 mAdc)		$V_{(BR)DSS}$	150	—	—	Vdc
Temperature Coefficient (Positive)			—	TBD	—	mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 150 Vdc, V_{GS} = 0 Vdc)		I_{DSS}	—	—	10	μAdc
(V_{DS} = 150 Vdc, V_{GS} = 0 Vdc, T_J =125°C)			—	—	100	
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)		$V_{GS(th)}$	2.0	2.7	4.0	Vdc
Threshold Temperature Coefficient (Negative)			—	TBD	—	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)		$V_{DS(on)}$	—	—	2.4	Vdc
(V_{GS} = 10 Vdc, I_D = 14.5 Adc, T_J = 125°C)			—	—	2.1	
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)	V_{SD}	—	0.92	1.3	Vdc
	(I_S = 29 Adc, V_{GS} = 0 Vdc, T_J = 125°C)		—	TBD	—	
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)		L_D	—	3.5	—	nH
(Measured from the drain lead 0.25″ from package to center of die)			—	4.5	—	
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.

	INCHES		MILLIMETERS	
DIM	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

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