

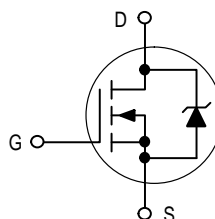
Advance Information

TMOS E-FET™

Power Field Effect Transistors D2PAK for Surface Mount Logic Level TMOS (L2TMOS™) N-Channel Enhancement-Mode Silicon Gate

These TMOS Power FETs are designed for high speed, low loss power switching applications such as switching regulators, converters, solenoid and relay drivers. This Logic Level Series part is specified to operate with level logic gate-to-source voltage of 5 volt and 4 volt.

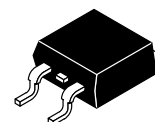
- Silicon Gate for Fast Switching Speeds
- Low $R_{DS(on)}$ — 0.028 Ω max
- Replace External Zener Transient Suppressor — Absorbs High Energy in the Avalanche Mode
- Specially Designed Leadframe for Maximum Power Dissipation
- Available in 24 mm 13-inch/800 Unit Tape & Reel, Add T4 Suffix to Part Number



MTB50N06EL

Motorola Preferred Device

TMOS POWER FET
LOGIC LEVEL
50 AMPERES
60 VOLTS
 $R_{DS(on)} = 0.028 \Omega$



CASE 418B-02, Style 2
D2PAK

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

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$)	V_{DGR}	60	Vdc
Gate-Source Voltage — Continuous	V_{GS}	± 15	Vdc
Drain Current — Continuous	I_D	50	Adc
— Continuous @ 100°C	I_D	28	
— Single Pulse ($t_p \leq 10 \mu\text{s}$)	I_{DM}	142	Apk
Total Power Dissipation	P_D	125	Watts
Derate above 25°C		1.0	W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$, when mounted with the minimum recommended pad size		2.5	Watts
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy — Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 25 \text{ Vdc}$, $V_{GS} = 5.0 \text{ Vpk}$, $I_L = 50 \text{ Apk}$, $L = 0.32 \text{ mH}$, $R_G = 25 \Omega$)	E_{AS}	400	mJ
Thermal Resistance — Junction to Case	$R_{\theta JC}$	1.0	$^\circ\text{C/W}$
— Junction to Ambient	$R_{\theta JA}$	62.5	
— Junction to Ambient, when mounted with the minimum recommended pad size	$R_{\theta JA}$	50	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

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

E-FET, Designer's and L2TMOS are trademarks of Motorola, Inc. TMOS is a registered trademark of Motorola, Inc. Thermal Clad is a trademark of the Bergquist Company

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

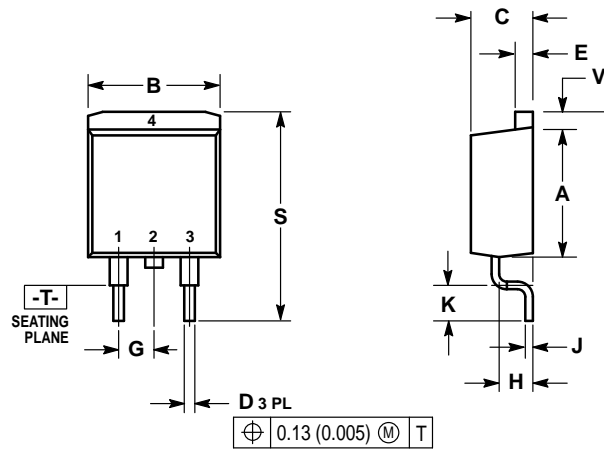
MTB50N06EL**ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit	
OFF CHARACTERISTICS						
Drain–Source Breakdown Voltage ($V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	60 —	— 64	— —	Vdc mV/°C	
Zero Gate Voltage Drain Current ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0$) ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0$, $T_J = 125^\circ\text{C}$)	I_{DSS}	— —	— —	10 100	μAdc	
Gate–Body Leakage Current ($V_{GS} = \pm 15\text{ Vdc}$, $V_{DS} = 0$)	I_{GSS}	—	—	100	nAdc	
ON CHARACTERISTICS (1)						
Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 —	— 4.78	2.0 —	Vdc mV/°C	
Static Drain–Source On–Resistance ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 25\text{ Adc}$) ($V_{GS} = 4.0\text{ Vdc}$, $I_D = 25\text{ Adc}$)	$R_{DS(on)}$	— —	— —	0.028 0.039	Ohm	
Drain–Source On–Voltage ($V_{GS} = 5.0\text{ Vdc}$) ($I_D = 50\text{ Adc}$) ($I_D = 25\text{ Adc}$, $T_J = 125^\circ\text{C}$)	$V_{DS(on)}$	— —	— —	1.68 1.40	Vdc	
Forward Transconductance ($V_{DS} = 15\text{ Vdc}$, $I_D = 25\text{ Adc}$)	g_{FS}	17	—	—	mhos	
DYNAMIC CHARACTERISTICS						
Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{iss}	—	3100	pF	
Output Capacitance		C_{oss}	—	1065		
Reverse Transfer Capacitance		C_{rss}	—	260		
SWITCHING CHARACTERISTICS (2)						
Turn–On Delay Time	$(V_{DD} = 25\text{ Vdc}$, $I_D = 50\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$)	$t_{d(on)}$	—	21	ns	
Rise Time		t_r	—	365		
Turn–Off Delay Time		$t_{d(off)}$	—	55		
Fall Time		t_f	—	150		
Gate Charge	$(V_{DS} = 48\text{ Vdc}$, $I_D = 50\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$)	Q_T	—	52	nC	
		Q_1	—	13		
		Q_2	—	34		
		Q_3	—	27		
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage	$(I_S = 50\text{ Adc}$, $V_{GS} = 0$) ($I_S = 50\text{ Adc}$, $V_{GS} = 0$, $T_J = ^\circ\text{C}$)	V_{SD}	— —	1.52 1.1	2.5 —	Vdc
Reverse Recovery Time	$(I_S = 50\text{ Adc}$, $V_{GS} = 0$, $dI_S/dt = 100\text{ A}/\mu\text{s}$)	t_{rr}	—	200	—	ns
INTERNAL PACKAGE INDUCTANCE						
Internal Drain Inductance (Measured from the tab to center of die)	L_d	—	3.5	—	nH	
Internal Source Inductance (Measured from the source lead 0.1" from package to source bond pad)	L_s	—	7.5	—	nH	

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

(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.

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-02
ISSUE B

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 can and do vary in different applications. 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.

Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.

ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.

