

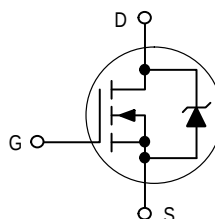
Advance Information

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.

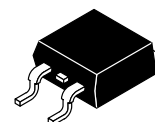
- Silicon Gate for Fast Switching Speeds
- Low $R_{DS(on)}$ — 0.028 Ω max
- Replace External Zener Transient Suppressor — Absorbs High Energy in the Avalanche Mode
- Specially Designed Leadframe for Maximum Power Dissipation
- Available in 24 mm 13-inch/800 Unit Tape & Reel, Add T4 Suffix to Part Number



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.

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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
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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/ $^\circ\text{C}$
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/ $^\circ\text{C}$
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	4340	pF
Output Capacitance		C_{oss}	—	1065	1491	
Reverse Transfer Capacitance		C_{rss}	—	260	520	

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	42	ns
Rise Time		t_r	—	365	730	
Turn–Off Delay Time		$t_{d(off)}$	—	55	110	
Fall Time		t_f	—	150	300	
Gate Charge	$(V_{DS} = 48\text{ Vdc}$, $I_D = 50\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$)	Q_T	—	52	73	nC
		Q_1	—	13	—	
		Q_2	—	34	—	
		Q_3	—	27	—	

SOURCE–DRAIN DIODE CHARACTERISTICS

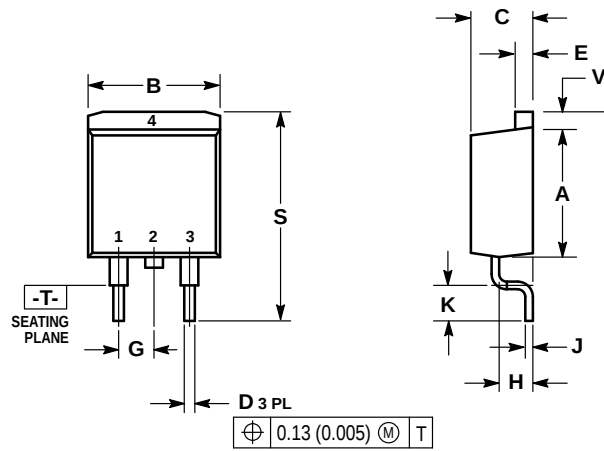
Forward On–Voltage	$(I_S = 50\text{ Adc}$, $V_{GS} = 0$) ($I_S = 50\text{ Adc}$, $V_{GS} = 0$, $T_J = ^\circ\text{C}$)	V_{SD}	— —	1.52 1.1	2.5 —	Vdc
Reverse Recovery Time	$(I_S = 50\text{ Adc}$, $V_{GS} = 0$, $dI_S/dt = 100\text{ A}/\mu\text{s}$)	t_{rr}	—	200	—	ns

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

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