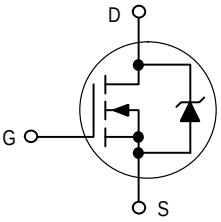
Product Preview

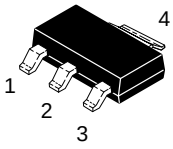
HDTMOS™ Single N-Channel Field Effect Transistor

Medium Power Surface Mount Products

MMFT6N03HD

TMOS POWER FET
6.0 AMPERES
30 VOLTS
$R_{DS(on)}$ = 0.050 OHM





CASE 318E–04, Style 3
TO–261AA

These medium power SOT–223 devices are an advanced series of power MOSFETs which utilize Motorola's High Cell Density HDTMOS process. These surface mount MOSFETs feature low $R_{DS(on)}$ and true logic level performance. They are capable of withstanding high energy in the avalanche and commutation modes and the drain–to–source diode has a very low reverse recovery time. SOT–223 HDTMOS devices are designed for use in low voltage, high speed switching applications where power efficiency is important. Typical applications are dc–dc converters, and power management in peripheral products such as printers and cordless phones. They can also be used for low voltage motor controls in mass storage products such as disk drives and tape drives. The avalanche energy is specified to eliminate the guesswork in designs where inductive loads are switched and offer additional safety margin against unexpected voltage transients.

- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Logic Level Gate Drive — Can Be Driven by Logic ICs
- SOT–223 Saves Board Space and Height
- Diode Is Characterized for Use In Bridge Circuits
- I_{DSS} Specified at Elevated Temperature
- Avalanche Energy Specified
- Mounting Information for SOT–223 Package Provided
- Use MMFT5N02HDT1 to order the 7 inch/1000 unit reel
  Use MMFT5N02HDT3 to order the 13 inch/4000 unit reel

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

Rating	Symbol	Value	Unit
Drain–to–Source Voltage	V_{DSS}	30	Vdc
Drain–to–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	30	Vdc
Gate–to–Source Voltage – Continuous	V_{GS}	± 20	Vdc
Drain Current – Continuous(1) – Continuous @ 100°C(1) – Single Pulse ($t_p \le 10$ μs)(1)	I_D I_D I_{DM}	6.0 3.7 40	Adc Apk
Total PD @ T_A = 25°C(1) Total PD @ T_A = 25°C(2)	P_D	1.8 0.8	Watts
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 = 6.0 Apk, L = 72 mH)	E_{AS}	1300	mJ
Thermal Resistance – Junction to Ambient(1) – Junction to Ambient(2)	 $R_{\theta JA}$ $R_{\theta JA}$	 70 156	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

(1) When mounted on 1" sq. Drain pad on FR–4 bd material
(2) When mounted on minimum recommended Drain pad on FR–4 bd material

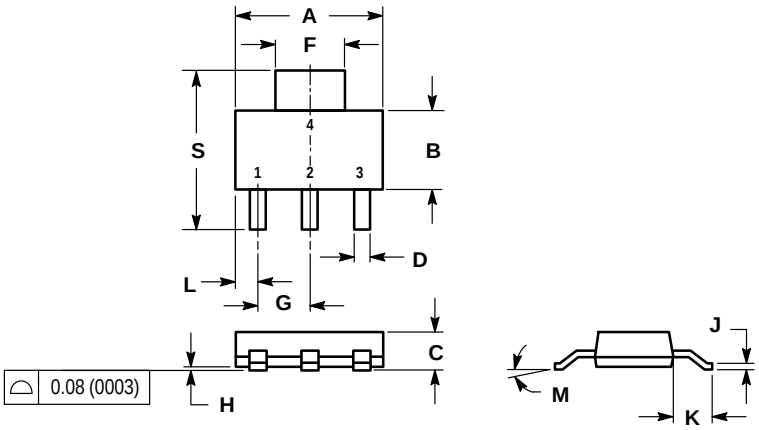
This document contains information on a new product. Specifications and information herein are subject to change without notice.
HDTMOS is a trademark of Motorola, Inc. TMOS is a registered trademark of Motorola, Inc.

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)		$V_{(BR)DSS}$	30	—	—	Vdc
Zero Gate Voltage Drain Current (V_{DS} = 30 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 30 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)		$V_{GS(th)}$	1.0	1.5	2.0	Vdc
Static Drain–to–Source On–Resistance (V_{GS} = 10 Vdc, I_D = 5.5 Adc) (V_{GS} = 4.5 Vdc, I_D = 4.3 Adc)		$R_{DS(on)}$	— —	0.040 0.053	0.050 0.060	Ohm
Forward Transconductance (V_{DS} = 10 Vdc, I_D = 5.5 Adc)		g_{FS}	6.0	9.5	—	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	—	420	—	pF
Output Capacitance		C_{oss}	—	190	—	
Transfer Capacitance		C_{rss}	—	65	—	
SWITCHING CHARACTERISTICS (2)						
Turn–On Delay Time	(V_{DD} = 15 Vdc, I_D = 6.0 Adc, V_{GS} = 10 Vdc, R_G = 6.0 Ω)	$t_{d(on)}$	—	6.0	15	ns
Rise Time		t_r	—	21	40	
Turn–Off Delay Time		$t_{d(off)}$	—	25	50	
Fall Time		t_f	—	30	60	
Gate Charge	(V_{DS} = 24 Vdc, I_D = 6.0 Adc, V_{GS} = 10 Vdc)	Q_T	—	15	30	nC
		Q_1	—	2.0	—	
		Q_2	—	4.3	—	
		Q_3	—	4.3	—	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage (1)	(I_S = 6.0 Adc, V_{GS} = 0 Vdc) (I_S = 6.0 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	— —	0.92 0.80	1.2 —	Vdc
Reverse Recovery Time	(I_S = 6.0 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	—	28	—	ns
		t_a	—	13	—	
		t_b	—	15	—	
Reverse Recovery Stored Charge		Q_{RR}	—	0.020	—	μC

(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.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.249	0.263	6.30	6.70
B	0.130	0.145	3.30	3.70
C	0.060	0.068	1.50	1.75
D	0.024	0.035	0.60	0.89
F	0.115	0.126	2.90	3.20
G	0.087	0.094	2.20	2.40
H	0.0008	0.0040	0.020	0.100
J	0.009	0.014	0.24	0.35
K	0.060	0.078	1.50	2.00
L	0.033	0.041	0.85	1.05
M	0 °	10 °	0 °	10 °
S	0.264	0.287	6.70	7.30

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

CASE 318E–04
ISSUE H

How to reach us:
USA / EUROPE / Locations Not Listed: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447 or 602–303–5454

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–81–3521–8315

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