

Product Preview

HDTMOS™ Single N-Channel Field Effect Transistor

Medium Power Surface Mount Products

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

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

(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

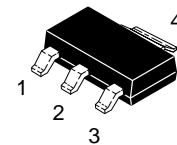
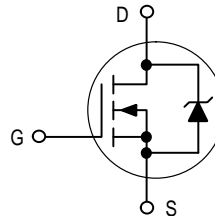
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MMFT6N03HD



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



CASE 318E-04, Style 3
TO-261AA



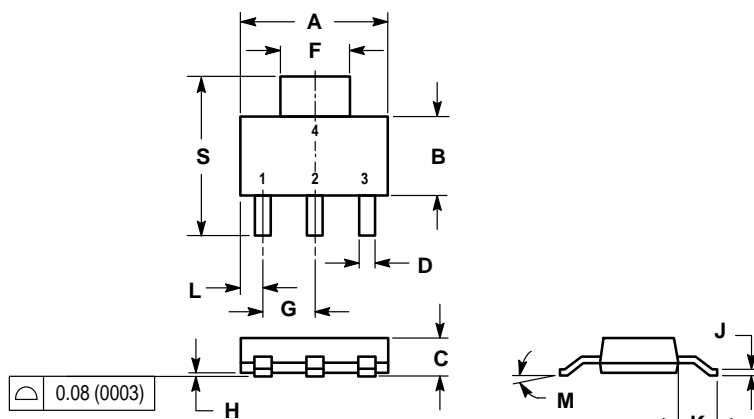
MMFT6N03HD**ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$ unless otherwise noted)

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	ns	
Rise Time		t _r	—	21		
Turn-Off Delay Time		t _{d(off)}	—	25		
Fall Time		t _f	—	30		
Gate Charge	(V _{DS} = 24 Vdc, I _D = 6.0 Adc, V _{GS} = 10 Vdc)	Q _T	—	15	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 $\leq 300\text{ }\mu\text{s}$, 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	0.249	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

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