


*Product Preview*  
**Medium Power Surface Mount Products**  
**TMOS Dual P-Channel**  
**Field Effect Transistors**



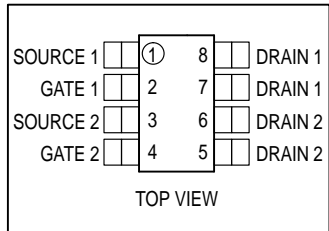
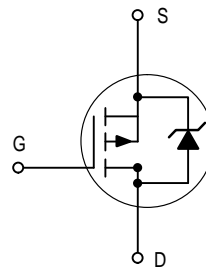
**MMDF3207**  
Motorola Preferred Device

**DUAL TMOS**  
**POWER MOSFET**  
**7.8 AMPERES**  
**20 VOLTS**  
**R<sub>DS(on)</sub> = 33 mΩ**

  
**CASE 751-06, Style 13**  
**SO-8**

WaveFET™ devices are an advanced series of power MOSFETs which utilize Motorola's latest MOSFET technology process to achieve the lowest possible on-resistance per silicon area. 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. WaveFET™ 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 portable and battery powered products such as computers, printers, cellular 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.

- Ultra Low R<sub>DS(on)</sub> Provides Higher Efficiency and Extends Battery Life in Portable Applications
- Characterized Over a Wide Range of Power Ratings
- Logic Level Gate Drive — Can Be Driven by Logic ICs
- Diode Is Characterized for Use In Bridge Circuits
- Diode Exhibits High Speed, with Soft Recovery
- I<sub>DSS</sub> Specified at Elevated Temperature
- Miniature SO-8 Surface Mount Package — Saves Board Space



**DEVICE MARKING**

**ORDERING INFORMATION**

D3207	Device	Reel Size	Tape Width	Quantity
		MMDF3207R2	13"	12 mm embossed tape

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

## MMDF3207

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise specified)

Characteristics		Symbol	Maximum	Unit
Drain-to-Source Voltage		V <sub>DSS</sub>	20	V
Drain-to-Gate Voltage (R <sub>GS</sub> = 1.0 MΩ)		V <sub>DGR</sub>	12	
Gate-to-Source Voltage — Continuous		V <sub>GS</sub>	±12	
1 Inch Square @ 10 seconds on FR-4 or G-10 PCB	Thermal Resistance — Junction to Ambient	R <sub>THJA</sub>	62.5	°C/W
	Total Power Dissipation @ T <sub>A</sub> = 25°C	P <sub>D</sub>	2.0	Watts
	Linear Derating Factor		16	mW/°C
	Drain Current — Continuous @ T <sub>A</sub> = 25°C	I <sub>D</sub>	7.8	A
	— Continuous @ T <sub>A</sub> = 70°C	I <sub>D</sub>	5.7	A
	— Pulsed Drain Current (1)	I <sub>DM</sub>	40	A
1 Inch Square @ Steady State on FR-4 or G-10 PCB	Thermal Resistance — Junction to Ambient	R <sub>THJA</sub>	98	°C/W
	Total Power Dissipation @ T <sub>A</sub> = 25°C	P <sub>D</sub>	1.28	Watts
	Linear Derating Factor		10.2	mW/°C
	Drain Current — Continuous @ T <sub>A</sub> = 25°C	I <sub>D</sub>	6.2	A
	— Continuous @ T <sub>A</sub> = 70°C	I <sub>D</sub>	4.6	A
	— Pulsed Drain Current (1)	I <sub>DM</sub>	35	A
Minimum Pad @ Steady State on FR-4 or G-10 PCB	Thermal Resistance — Junction to Ambient	R <sub>THJA</sub>	166	°C/W
	Total Power Dissipation @ T <sub>A</sub> = 25°C	P <sub>D</sub>	0.75	Watts
	Linear Derating Factor		6.0	mW/°C
	Drain Current — Continuous @ T <sub>A</sub> = 25°C	I <sub>D</sub>	4.8	A
	— Continuous @ T <sub>A</sub> = 70°C	I <sub>D</sub>	3.5	A
	— Pulsed Drain Current (1)	I <sub>DM</sub>	30	A
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	°C

(1) Repetitive rating; pulse width limited by maximum junction temperature.

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

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Drain-to-Source Breakdown Voltage <sup>(1)</sup> ( $V_{GS} = 0\text{ Vdc}$ , $I_D = 0.25\text{ mAdc}$ ) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	20 —	— TBD	— —	Vdc mV/°C
Zero Gate Voltage Drain Current ( $V_{DS} = 20\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ ) ( $V_{DS} = 20\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ , $T_J = 55^\circ\text{C}$ )	$I_{DSS}$	— —	— —	1.0 5.0	$\mu\text{Adc}$
Gate-Body Leakage Current ( $V_{GS} = \pm 12\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	—	—	100	nAdc

**ON CHARACTERISTICS<sup>(1)</sup>**

Gate Threshold Voltage <sup>(1)</sup> ( $V_{DS} = V_{GS}$ , $I_D = 0.25\text{ mAdc}$ ) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	0.6 —	— TBD	— —	Vdc mV/°C
Static Drain-to-Source On-Resistance <sup>(1)</sup> ( $V_{GS} = 4.5\text{ Vdc}$ , $I_D = 7.8\text{ Adc}$ ) ( $V_{GS} = 2.5\text{ Vdc}$ , $I_D = 6.2\text{ Adc}$ )	$R_{DS(on)}$	— —	TBD TBD	33 50	m $\Omega$
Forward Transconductance ( $V_{DS} = 10\text{ Vdc}$ , $I_D = 7.8\text{ Adc}$ ) <sup>(1)</sup>	$g_{FS}$	—	TBD	—	Mhos

**DYNAMIC CHARACTERISTICS**

Input Capacitance	$(V_{DS} = 15\text{ Vdc}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$	—	TBD	TBD	pF
Output Capacitance		$C_{oss}$	—	TBD	TBD	
Transfer Capacitance		$C_{rss}$	—	TBD	TBD	

**SWITCHING CHARACTERISTICS<sup>(2)</sup>**

Turn-On Delay Time	$(V_{DS} = 10\text{ Vdc}$ , $I_D = 1.0\text{ Adc}$ , $V_{GS} = 10\text{ Vdc}$ , $R_G = 6.0\ \Omega$ ) <sup>(1)</sup>	$t_{d(on)}$	—	TBD	TBD	ns
Rise Time		$t_r$	—	TBD	TBD	
Turn-Off Delay Time		$t_{d(off)}$	—	TBD	TBD	
Fall Time		$t_f$	—	TBD	TBD	
Turn-On Delay Time	$(V_{DD} = 10\text{ Vdc}$ , $I_D = 1.0\text{ Adc}$ , $V_{GS} = 4.5\text{ Vdc}$ , $R_G = 6.0\ \Omega$ ) <sup>(1)</sup>	$t_{d(on)}$	—	TBD	TBD	ns
Rise Time		$t_r$	—	TBD	TBD	
Turn-Off Delay Time		$t_{d(off)}$	—	TBD	TBD	
Fall Time		$t_f$	—	TBD	TBD	
Gate Charge	$(V_{DS} = 10\text{ Vdc}$ , $I_D = 7.8\text{ Adc}$ , $V_{GS} = 4.5\text{ Vdc}$ ) <sup>(1)</sup>	$Q_T$	—	TBD	TBD	nC
		$Q_1$	—	TBD	—	
		$Q_2$	—	TBD	—	
		$Q_3$	—	TBD	—	

**SOURCE-DRAIN DIODE CHARACTERISTICS**

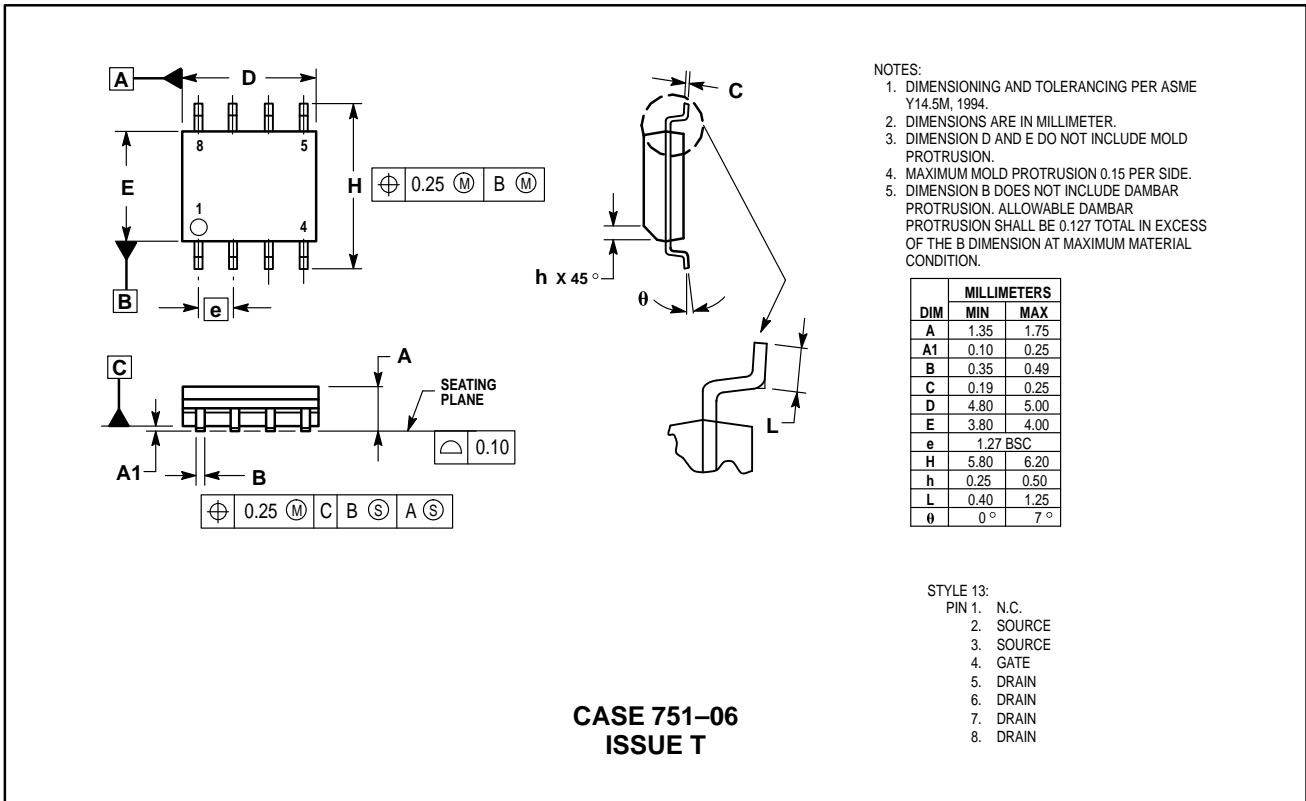
Forward On-Voltage	$(I_S = 1.7\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ ) <sup>(1)</sup> $(I_S = 1.7\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ , $T_J = 125^\circ\text{C}$ )	$V_{SD}$	— —	TBD TBD	1.2 —	Vdc
Reverse Recovery Time	$(I_S = 1.7\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ , $di_S/dt = 100\text{ A}/\mu\text{s}$ ) <sup>(1)</sup>	$t_{rr}$	—	TBD	—	ns
		$t_a$	—	TBD	—	
		$t_b$	—	TBD	—	
Reverse Recovery Stored Charge		$Q_{RR}$	—	TBD	—	$\mu\text{C}$

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

(2) Switching characteristics are independent of operating junction temperatures.

(3) Repetitive rating; pulse width limited by max. junction temperature.

**PACKAGE DIMENSIONS**



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