



## 20V N-Channel Enhancement-Mode MOSFET

$V_{DS} = 20V$

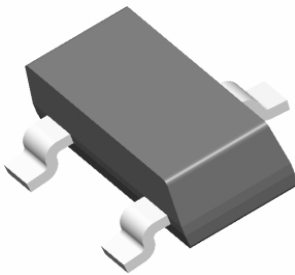
$R_{DS(ON)}, V_{GS}@4.5V, I_{DS}@2.8A = 60m\Omega$

$R_{DS(ON)}, V_{GS}@2.5V, I_{DS}@2.0A = 115m\Omega$

### Features

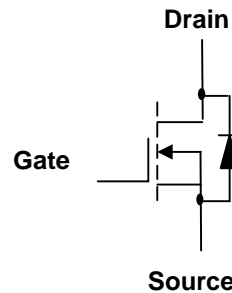
Advanced trench process technology  
 High Density Cell Design For Ultra Low On-Resistance  
 Fully Characterized Avalanche Voltage and Current  
 Improved Shoot-Through FOM

**TO-236  
(SOT-23)**



**Top View**

**Internal Schematic Diagram**



**N-Channel MOSFET**

### Maximum Ratings and Thermal Characteristics ( $T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$		
Continuous Drain Current	$I_D$	2.3	A	
Pulsed Drain Current <sup>1)</sup>	$I_{DM}$	10		
Maximum Power Dissipation		$T_A = 25^\circ C$	0.9	W
		$T_A = 75^\circ C$	0.57	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ C$	
Avalanche Energy with Single Pulse $I_D=50A, V_{DD}=25V, L=0.5mH$	$E_{AS}$		mJ	
Junction-to-Case Thermal Resistance	$R_{\theta JC}$		$^\circ C/W$	
Junction-to-Ambient Thermal Resistance (PCB mounted) <sup>2)</sup>	$R_{\theta JA}$	145		

Note: 1. Maximum DC current limited by the package

2. 1-in<sup>2</sup> 2oz Cu PCB board



# FMM23N20 2.3A 20V N-Channel Enhancement-Mode MOSFET

## N-Channel Enhancement-Mode MOSFET ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -10\mu A$	20	-	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 2.8A$		45	60	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 2.5V, I_D = 2.0A$		70	115	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.65	0.95	1.20	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 9.6V, V_{GS} = 0V$			-1	$\mu A$
Gate Body Leakage	$I_{GSS}$	$V_{GS} = \pm 8V, V_{DS} = 0V$			$\pm 100$	nA
Gate Resistance	$R_g$					$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 5V, I_D = 4.0A$		6.5		S
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 6V, I_D = 2.8A$ $V_{GS} = 4.5V$		3.69		nC
Gate-Source Charge	$Q_{gs}$			0.70		
Gate-Drain Charge	$Q_{gd}$			1.06		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6V, R_L = 6\Omega$ $I_D = 1A, V_{GEN} = 4.5V$ $R_G = 6\Omega$		6.16		ns
Turn-On Rise Time	$t_r$			7.56		
Turn-Off Delay Time	$t_{d(off)}$			16.61		
Turn-Off Fall Time	$t_f$			4.07		
Input Capacitance	$C_{iss}$	$V_{DS} = 6V, V_{GS} = 0V$ $f = 1.0\text{ MHz}$		427.12		pF
Output Capacitance	$C_{oss}$			80.56		
Reverse Transfer Capacitance	$C_{rss}$			57.00		
<b>Source-Drain Diode</b>						
Max. Diode Forward Current	$I_S$					A
Diode Forward Voltage	$V_{SD}$	$I_S = -1.6A, V_{GS} = 0V$				V

Note: Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$

