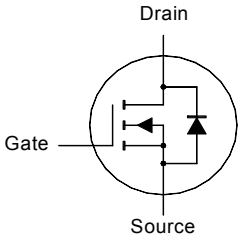
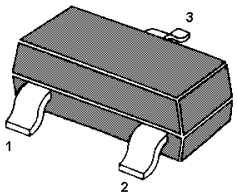
MMFTN4006

N-Channel Enhancement Mode MOSFET

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage





1. Gate 2. Source 3. Drain
SOT-23 Plastic Package

Applications

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

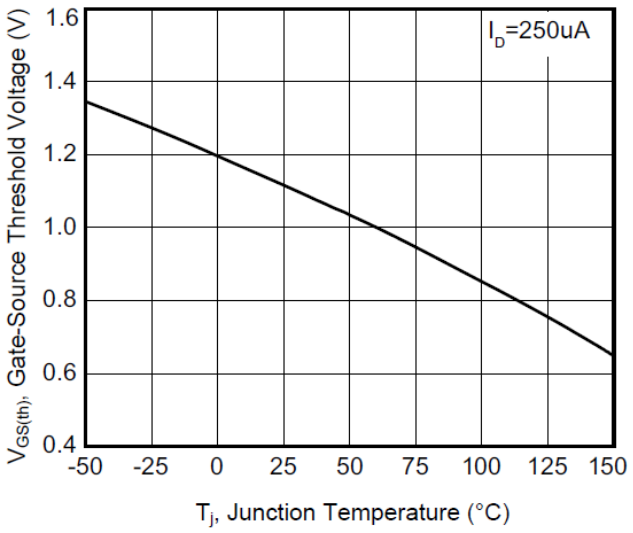
Absolute Maximum Ratings (T_a = 25℃ unless otherwise specified)

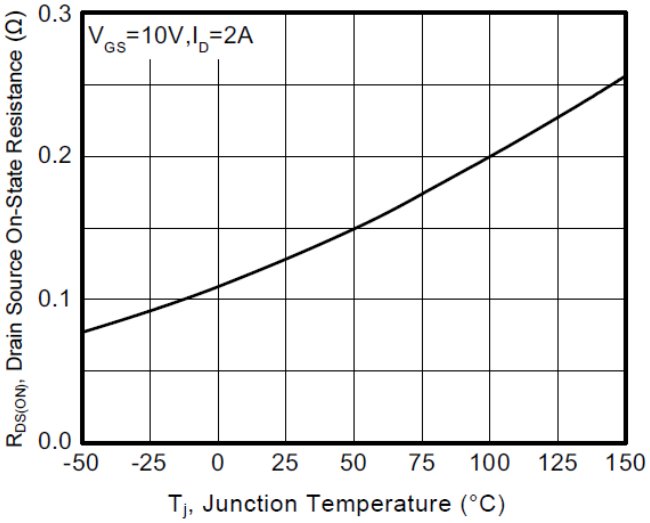
Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	45	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current [1] (tp ≤ 10 s)	T_a = 25 ℃ T_a = 70 ℃	I_D	1.7 1.3	A
Continuous Drain Current [1] (Steady State)	T_a = 25 ℃ T_a = 70 ℃	I_D	1.5 1.2	A
Continuous Drain Current [2] (tp ≤ 10 s)	T_a = 25 ℃ T_a = 70 ℃	I_D	1.5 1.2	A
Continuous Drain Current [2] (Steady State)	T_a = 25 ℃ T_a = 70 ℃	I_D	1.4 1.1	A
Peak Drain Current, Pulsed (tp < 380 μs)		I_{DM}	8	A
Power Dissipation [1] (tp ≤ 10 s)	T_a = 25 ℃ T_a = 70 ℃	P_D	0.8 0.5	W
Power Dissipation [1] (Steady State)	T_a = 25 ℃ T_a = 70 ℃	P_D	0.7 0.4	W
Power Dissipation [2] (tp ≤ 10 s)	T_a = 25 ℃ T_a = 70 ℃	P_D	0.7 0.4	W
Power Dissipation [2] (Steady State)	T_a = 25 ℃ T_a = 70 ℃	P_D	0.6 0.3	W
Thermal Resistance Junction to Case	Steady State	$R_{\theta JC}$	75	℃/W
Thermal Resistance Junction to Ambient [1]	tp ≤ 10 s Steady State	$R_{\theta JA}$	145 170	℃/W
Thermal Resistance Junction to Ambient [2]	tp ≤ 10 s Steady State	$R_{\theta JA}$	174 202	℃/W
Operating Junction Temperature		T_j	150	℃
Storage Temperature Range		T_j, T_{stg}	- 55 to + 150	℃

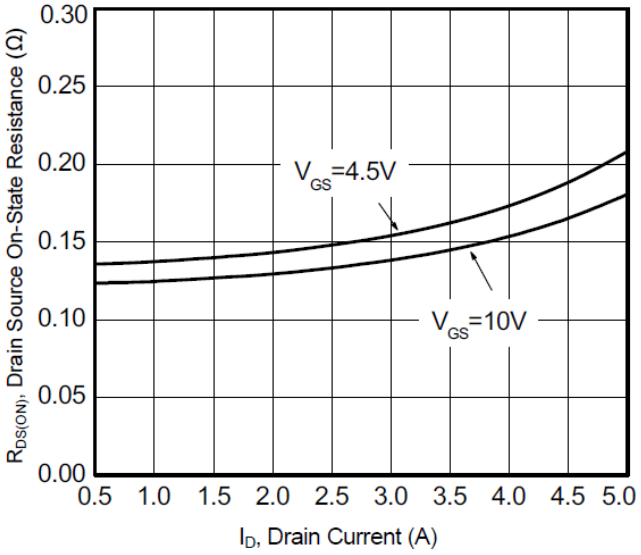
[1] Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper.
[2] Surface mounted on FR-4 board using minimum pad size, 1oz copper.

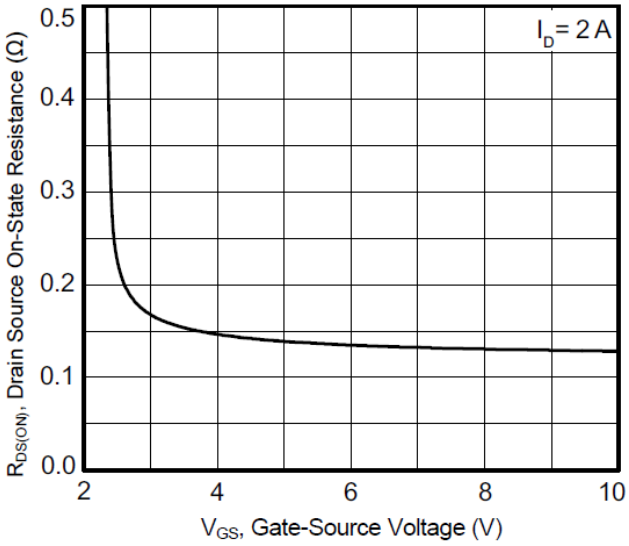
Characteristics at T_a = 25℃ unless otherwise specified

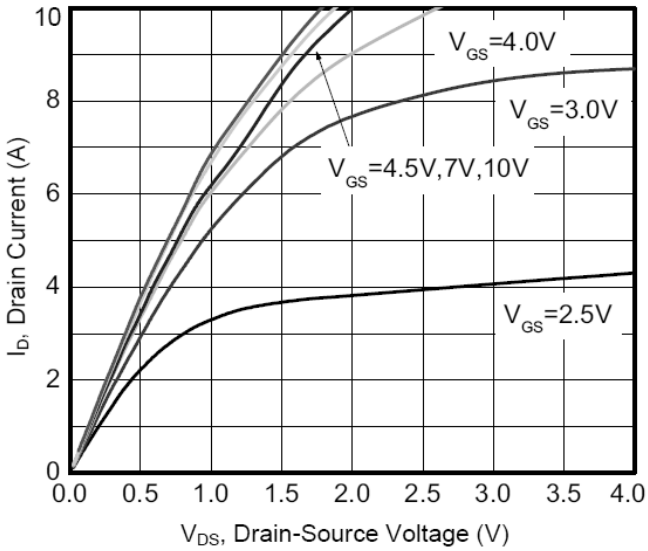
Parameter	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage at I_D = 250 µA	$V_{(BR)DSS}$	45	-	-	V
Drain-Source Leakage Current at V_{DS} = 45 V	I_{DSS}	-	-	1	µA
Gate-Source Leakage Current at V_{GS} = ± 20 V	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at V_{GS} = V_{DS}, I_D = 250 µA	$V_{GS(th)}$	0.5	-	1.6	V
Drain-Source On-State Resistance at V_{GS} = 10 V, I_D = 2 A at V_{GS} = 4.5 V, I_D = 2 A at V_{GS} = 4 V, I_D = 2 A at V_{GS} = 2.5 V, I_D = 1.5 A	$R_{DS(on)}$	- - - -	- - - -	160 180 185 250	mΩ
Forward Transconductance at V_{DS} = 10 V, I_D = 2 A	g_{FS}	-	3	-	S
Input Capacitance at V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	315	-	pF
Output Capacitance at V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	18	-	pF
Reverse Transfer Capacitance at V_{DG} = 25 V, f = 1 MHz	C_{rss}	-	15	-	pF
Gate Charge Total at V_{DS} = 25 V, V_{GS} = 4.5 V, I_D = 2 A	Q_g	-	4.2	-	nC
Gate to Source Gate Charge at V_{DS} = 25 V, V_{GS} = 4.5 V, I_D = 2 A	Q_{gs}	-	0.76	-	nC
Gate to Drain Charge at V_{DS} = 25 V, V_{GS} = 4.5 V, I_D = 2 A	Q_{gd}	-	1.85	-	nC
Turn-On Delay Time at V_{DS} = 25 V, V_{GS} = 10 V, R_G = 6 Ω, R_L = 25 Ω	$t_{d(on)}$	-	4.8	-	ns
Rise Time at V_{DS} = 25 V, V_{GS} = 10 V, R_G = 6 Ω, R_L = 25 Ω	t_r	-	3	-	ns
Turn-Off Delay Time at V_{DS} = 25 V, V_{GS} = 10 V, R_G = 6 Ω, R_L = 25 Ω	$t_{d(off)}$	-	27	-	ns
Fall Time at V_{DS} = 25 V, V_{GS} = 10 V, R_G = 6 Ω, R_L = 25 Ω	t_f	-	2.6	-	ns
Body Diode Voltage at I_S = 0.8 A, V_{GS} = 0 V	V_{SD}	-	-	1.5	V

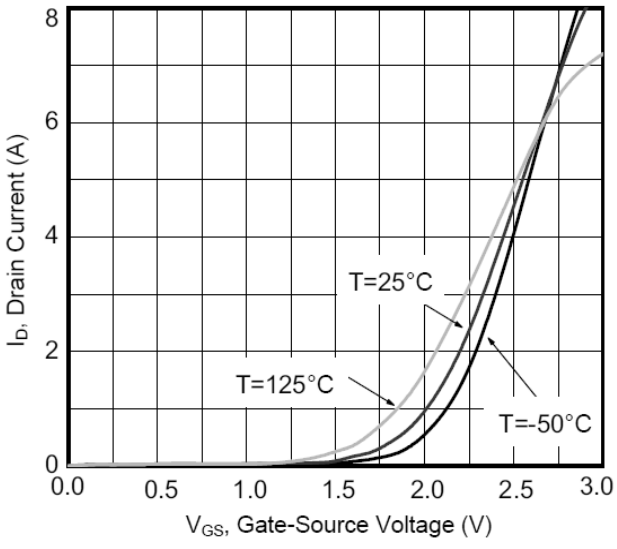

I_D=250uA
$V_{GS(th)}$, Gate-Source Threshold Voltage (V)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
-50 -25 0 25 50 75 100 125 150
T_j, Junction Temperature (°C)


V_{GS}=10V,I_D=2A
$R_{DS(ON)}$, Drain Source On-State Resistance (Ω)
0.3
0.2
0.1
0.0
-50 -25 0 25 50 75 100 125 150
T_j, Junction Temperature (°C)


V_{GS}=4.5V
V_{GS}=10V
$R_{DS(ON)}$, Drain Source On-State Resistance (Ω)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
I_D, Drain Current (A)

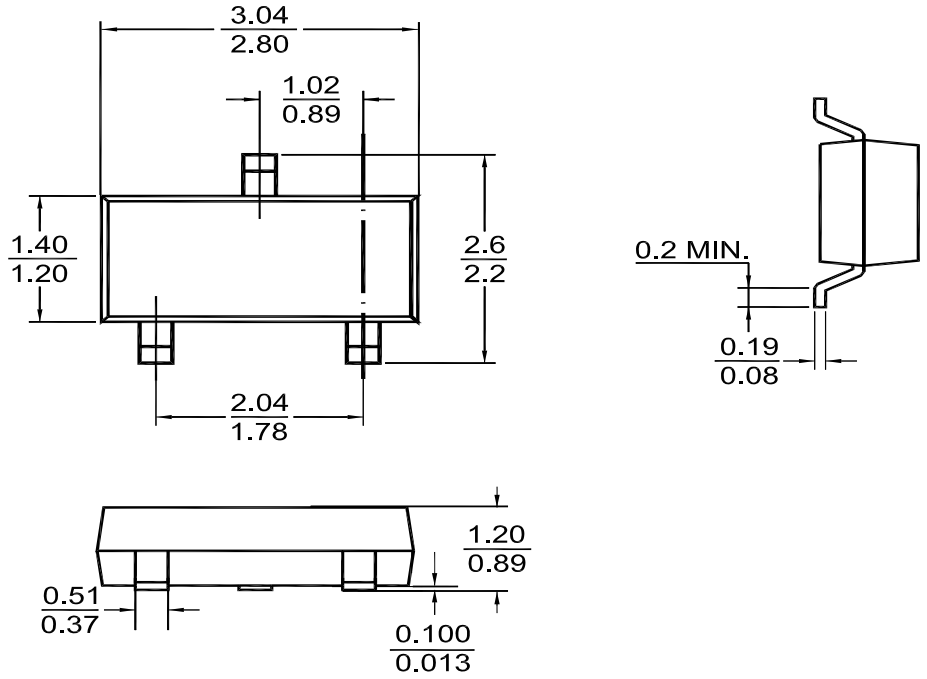

I_D= 2 A
$R_{DS(ON)}$, Drain Source On-State Resistance (Ω)
0.5
0.4
0.3
0.2
0.1
0.0
2 4 6 8 10
V_{GS}, Gate-Source Voltage (V)


V_{GS}=4.0V
V_{GS}=3.0V
V_{GS}=4.5V,7V,10V
V_{GS}=2.5V
I_D, Drain Current (A)
10
8
6
4
2
0
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
V_{DS}, Drain-Source Voltage (V)

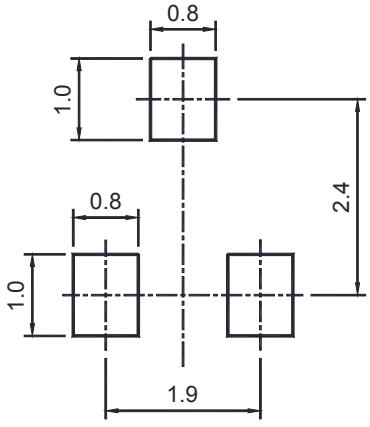

T=25°C
T=125°C
T=-50°C
I_D, Drain Current (A)
8
6
4
2
0
0.0 0.5 1.0 1.5 2.0 2.5 3.0
V_{GS}, Gate-Source Voltage (V)

PACKAGE OUTLINE

Plastic surface mounted package (Dimensions in mm) **SOT-23**



Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-23	8	4 ± 0.1	0.157 ± 0.004	178	7	3,000