

# MMFTN620K

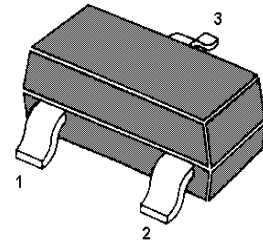
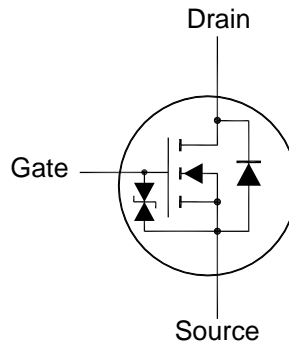
## N-Channel Enhancement Mode Power MOSFET

### Features

- ESD protected

### Applications

- Portable appliances



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

### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ unless otherwise specified)

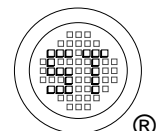
Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Drain-Gate Voltage	$V_{GS}$	$\pm 20$	V
Drain Current (Steady State) <sup>1)</sup> at $V_{GS} = 4.5\text{ V}$	$I_D$	$T_a = 25^\circ\text{C}$ 380 $T_a = 70^\circ\text{C}$ 300	mA
Drain Current ( $t < 5\text{ s}$ ) <sup>1)</sup> at $V_{GS} = 4.5\text{ V}$	$I_D$	$T_a = 25^\circ\text{C}$ 430 $T_a = 70^\circ\text{C}$ 340	mA
Peak Drain Current, Pulsed <sup>1)</sup> (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	1.2	A
Total Power Dissipation <sup>1)</sup>	$P_{tot}$	590	mW
Total Power Dissipation <sup>2)</sup>	$P_{tot}$	380	mW
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	- 55 to + 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Ambient <sup>1)</sup> $t < 5\text{ s}$ Steady State	$R_{\theta JA}$	117 216	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient <sup>2)</sup> $t < 5\text{ s}$ Steady State	$R_{\theta JA}$	292 338	$^\circ\text{C/W}$

<sup>1)</sup> Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate

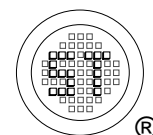
<sup>2)</sup> Device mounted on FR-4 PCB, with minimum recommended pad layout.



# MMFTN620K

Characteristics at  $T_a = 25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>					
Drain-Source Breakdown Voltage at $I_D = 10\ \mu\text{A}$	$V_{(BR)DSS}$	60	-	-	V
Drain-Source Leakage Current at $V_{DS} = 60\ \text{V}$	$I_{DSS}$	-	-	1	$\mu\text{A}$
Gate-Source Leakage Current at $V_{GS} = \pm 20\ \text{V}$	$I_{GSS}$	-	-	$\pm 10$	$\mu\text{A}$
Gate-Source Threshold Voltage at $V_{DS} = 10\ \text{V}$ , $I_D = 250\ \mu\text{A}$	$V_{GS(th)}$	0.5	-	1	V
Drain-Source On-State Resistance at $V_{GS} = 10\ \text{V}$ , $I_D = 500\ \text{mA}$ at $V_{GS} = 4.5\ \text{V}$ , $I_D = 100\ \text{mA}$ at $V_{GS} = 2.5\ \text{V}$ , $I_D = 50\ \text{mA}$ at $V_{GS} = 1.8\ \text{V}$ , $I_D = 50\ \text{mA}$	$R_{DS(on)}$	- - - -	- - - -	1.8 2 2.5 3	$\Omega$
<b>DYNAMIC PARAMETERS</b>					
Gate resistance at $V_{DS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$	$R_g$	-	38	-	$\Omega$
Forward Transconductance at $V_{DS} = 5\ \text{V}$ , $I_D = 0.4\ \text{A}$	$g_{FS}$	-	760	-	mS
Input Capacitance at $V_{DS} = 10\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$	$C_{iss}$	-	51	-	pF
Output Capacitance at $V_{DS} = 10\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$	$C_{oss}$	-	11	-	pF
Reverse Transfer Capacitance at $V_{DS} = 10\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$	$C_{rss}$	-	8	-	pF
Total Gate Charge at $V_{GS} = 4.5\ \text{V}$ , $V_{DS} = 10\ \text{V}$ , $I_D = 0.5\ \text{A}$	$Q_g$	-	280	-	pC
Gate-Source Charge at $V_{GS} = 4.5\ \text{V}$ , $V_{DS} = 10\ \text{V}$ , $I_D = 0.5\ \text{A}$	$Q_{gs}$	-	82	-	pC
Gate-Drain Charge at $V_{GS} = 4.5\ \text{V}$ , $V_{DS} = 10\ \text{V}$ , $I_D = 0.5\ \text{A}$	$Q_{gd}$	-	201	-	pC
Turn-On Delay Time at $V_{DD} = 10\ \text{V}$ , $I_D = 1\ \text{A}$ , $V_{GS} = 4.5\ \text{V}$ , $R_{GEN} = 51\ \Omega$	$t_{d(on)}$	-	13	-	ns
Turn-On Rise Time at $V_{DD} = 10\ \text{V}$ , $I_D = 1\ \text{A}$ , $V_{GS} = 4.5\ \text{V}$ , $R_{GEN} = 51\ \Omega$	$t_r$	-	13	-	ns
Turn-Off Delay Time at $V_{DD} = 10\ \text{V}$ , $I_D = 1\ \text{A}$ , $V_{GS} = 4.5\ \text{V}$ , $R_{GEN} = 51\ \Omega$	$t_{d(off)}$	-	7.7	-	ns
Turn-Off Fall Time at $V_{DD} = 10\ \text{V}$ , $I_D = 1\ \text{A}$ , $V_{GS} = 4.5\ \text{V}$ , $R_{GEN} = 51\ \Omega$	$t_f$	-	4.6	-	ns
<b>Body-Diode PARAMETERS</b>					
Drain-Source Diode Forward Voltage at $I_S = 115\ \text{mA}$	$V_{SD}$	-	-	1.3	V
Body Diode Reverse Recovery Time at $I_S = 1\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$	$t_{rr}$	-	9	-	ns
Body Diode Reverse Recovery Charge at $I_S = 1\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$	$Q_{rr}$	-	3.7	-	nC



## Electrical Characteristics Curves

Fig.1 Output Characteristic

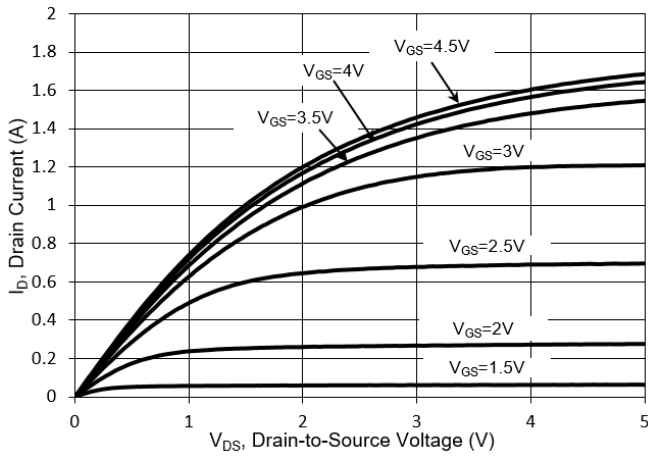


Fig.2 Transfer Characteristic

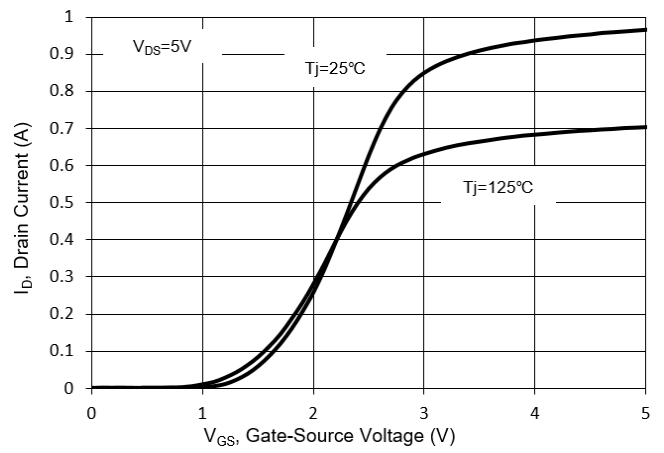


Fig.3 On Resistance vs. Gate-Source

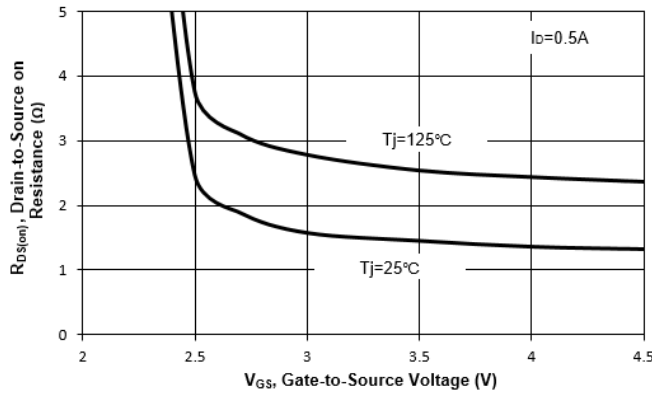


Fig.4 On Resistance vs. Temperature vs. on Resistance

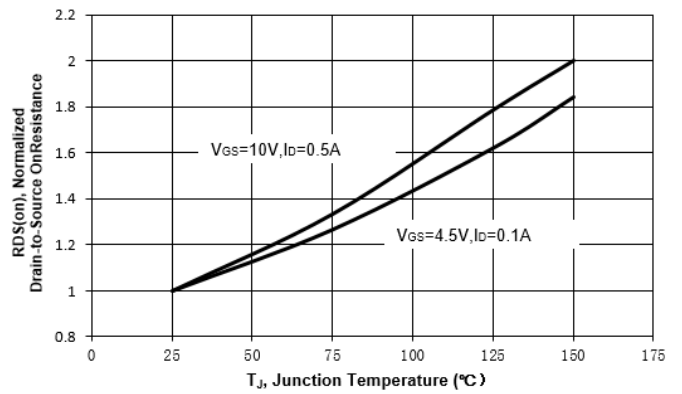


Fig.5 Drain Current vs. on Resistance

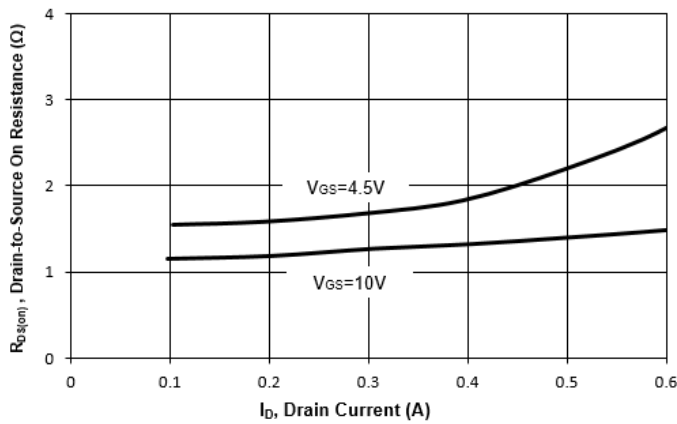
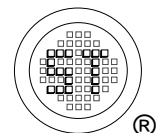
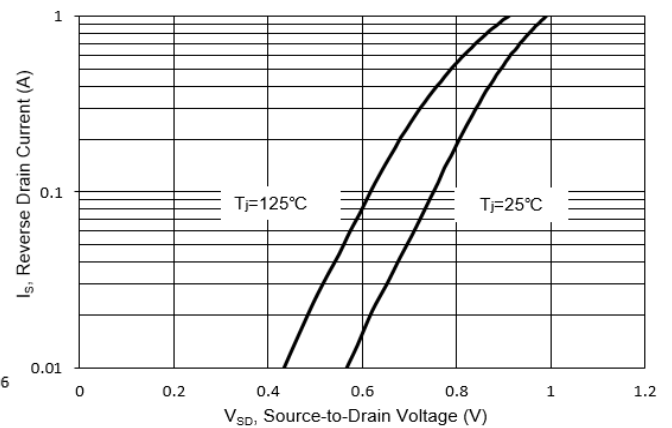


Fig.6 Source-Drain Diode Forward



# MMFTN620K

## Electrical Characteristics Curves

Fig.7 Drain-Source Breakdown Voltage Vs Tj

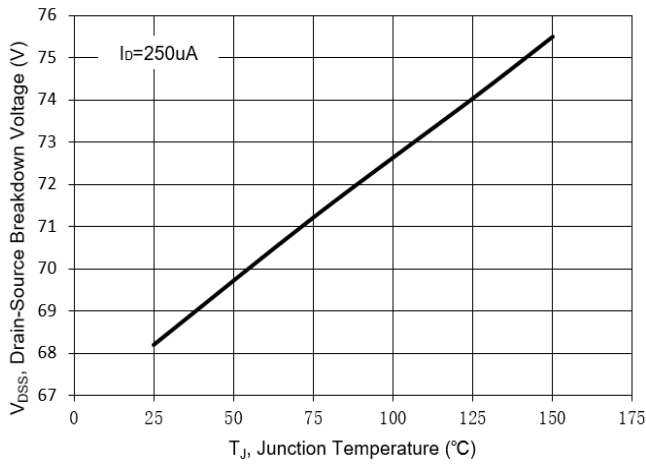


Fig.8 Gate-Source Threshold Voltage Vs Tj

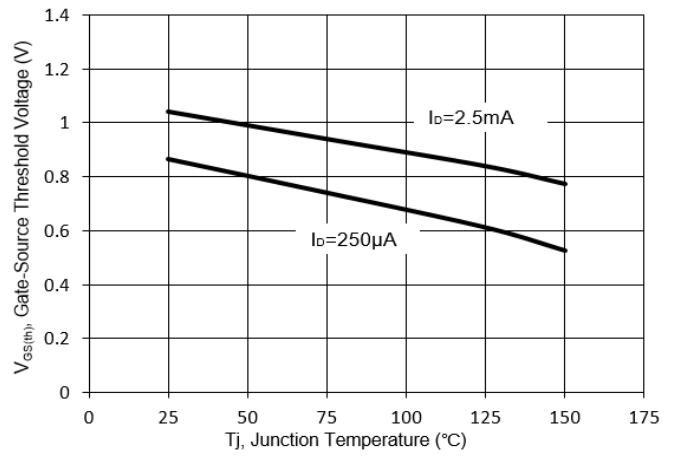
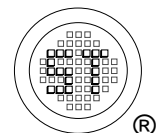
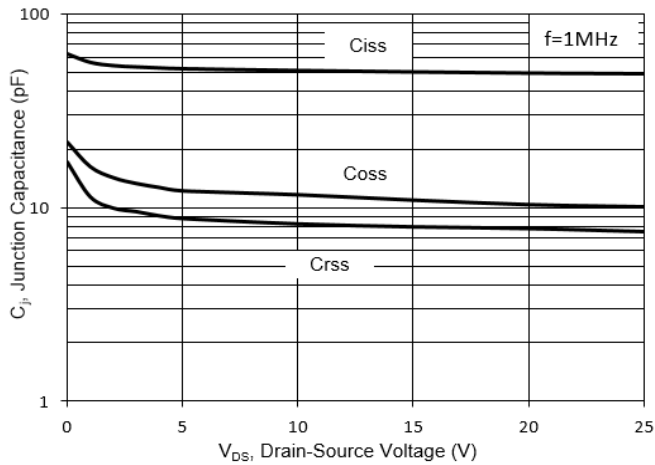


Fig.9 Capacitance Characteristic vs. on Resistance



## Test Circuits

Fig.1-1 Switching times test circuit

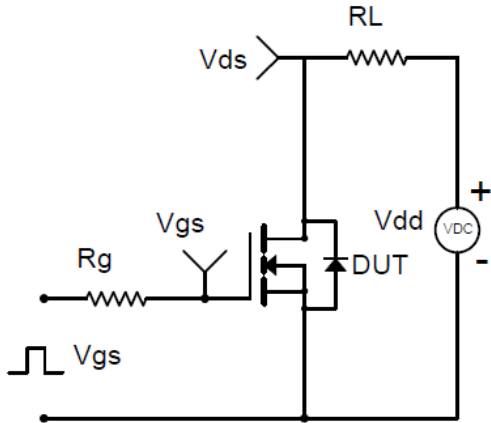


Fig.1-2 Switching Waveform

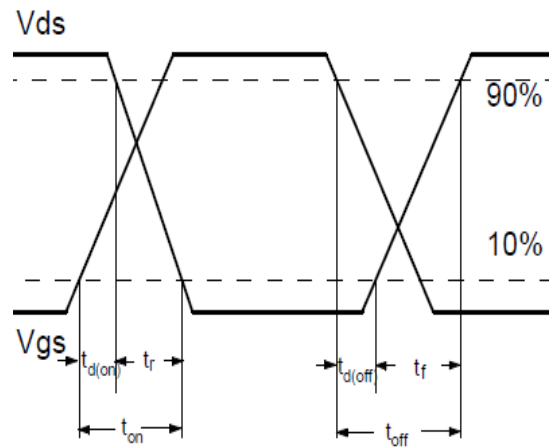


Fig.2-1 Gate charge test circuit

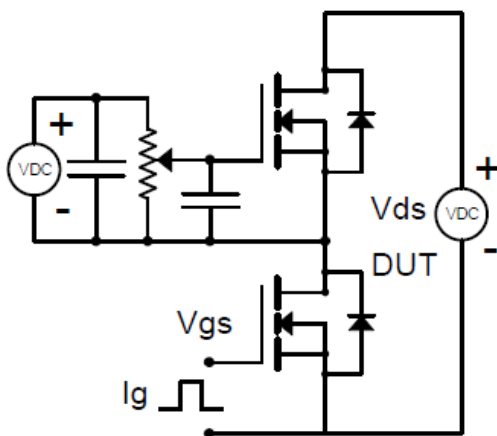
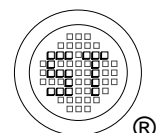
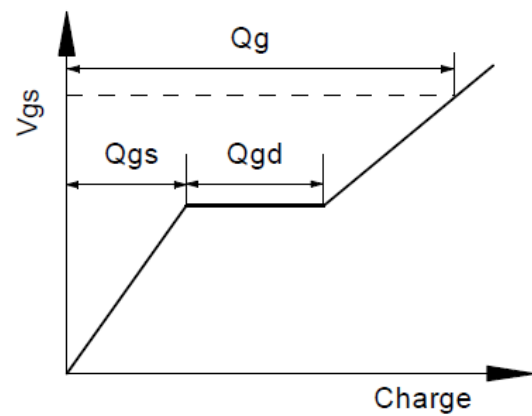
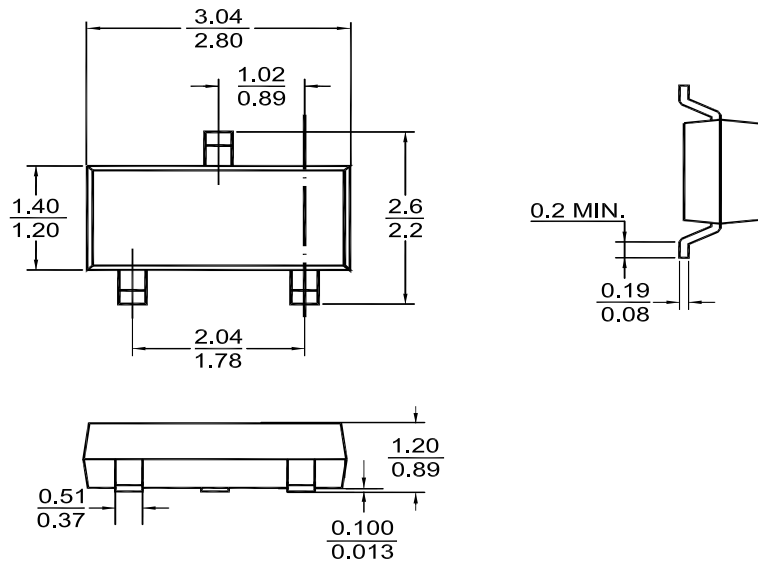


Fig.2-2 Gate charge waveform

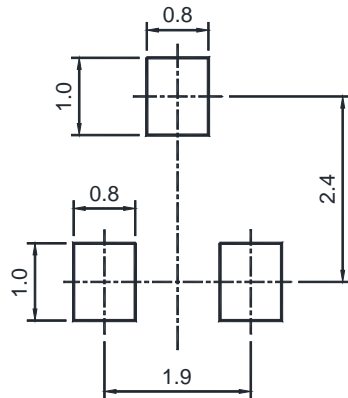


## Package Outline (Dimensions in mm)

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

## Marking information

"VD" = Part No.

"YM" = Date Code Marking

"Y" = Year

"M" = Month

Font type: Arial

