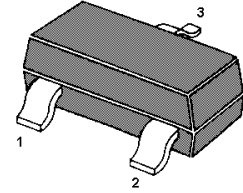
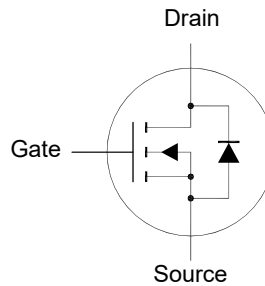


# MMFTN6140

## N-Channel Enhancement Mode MOSFET

### Applications

- Portable appliances
- Battery management



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

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current	$I_D$	2	A
Peak Drain Current, Pulsed <sup>1)</sup>	$I_{DM}$	10	A
Power Dissipation	$P_D$	0.7 <sup>2)</sup> 1.3 <sup>3)</sup>	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	$^\circ\text{C}$

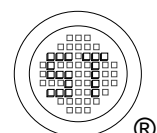
### Thermal Resistance Ratings

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	90 <sup>3)</sup>	$^\circ\text{C/W}$

<sup>1)</sup> Pulse Test: Pulse Width  $\leq 100 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ , Repetitive rating, pulse width limited by junction temperature  $T_{J(\text{MAX})} = 150^\circ\text{C}$ .

<sup>2)</sup> Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad.

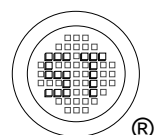
<sup>3)</sup> Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate,  $t \leq 10 \text{ s}$ .



# MMFTN6140

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 $I_D = 250 \mu\text{A}$	$V_{(BR)DSS}$	60	-	-	V
Zero Gate Voltage Drain Current at $V_{DS} = 60 \text{ V}$	$I_{DSS}$	-	-	1	$\mu\text{A}$
Gate-Source Leakage at $V_{GS} = \pm 20 \text{ V}$	$I_{GSS}$	-	-	$\pm 100$	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	$V_{GS(th)}$	1	-	2.2	V
Drain-Source On-State Resistance at $V_{GS} = 10 \text{ V}$ , $I_D = 1.8 \text{ A}$ at $V_{GS} = 4.5 \text{ V}$ , $I_D = 1.3 \text{ A}$	$R_{DS(on)}$	-	-	140 170	m $\Omega$
<b>DYNAMIC PARAMETERS</b>					
Forward Transconductance at $V_{DS} = 15 \text{ V}$ , $I_D = 1.8 \text{ A}$	$g_{FS}$	-	2.2	-	S
Input Capacitance at $V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{iss}$	-	498	-	pF
Output Capacitance at $V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{oss}$	-	25	-	pF
Reverse Transfer Capacitance at $V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{rss}$	-	21	-	pF
Total Gate Charge at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$	$Q_g$	-	9.5	-	nC
Gate Source Charge at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$	$Q_{gs}$	-	2.2	-	nC
Gate Drain Charge at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$	$Q_{gd}$	-	1.1	-	nC
Turn-On Delay Time at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_G = 3.9 \Omega$	$t_{d(on)}$	-	4.5	-	ns
Turn-On Rise Time at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_G = 3.9 \Omega$	$t_r$	-	3	-	ns
Turn-Off Delay Time at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_G = 3.9 \Omega$	$t_{d(off)}$	-	14	-	ns
Turn-Off Fall Time at $V_{DS} = 30 \text{ V}$ , $I_D = 2 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_G = 3.9 \Omega$	$t_f$	-	6	-	ns
<b>BODY DIODE PARAMETERS</b>					
Drain-Source Diode Forward Voltage at $V_{GS} = 0 \text{ V}$ , $I_S = 0.45 \text{ A}$	$V_{SD}$	-	-	1	V
Body-Diode Continuous Current	$I_S$	-	-	2	A
Body Diode Reverse Recovery Time at $I_S = 2 \text{ A}$ , $di/dt = 100 \text{ A} / \mu\text{s}$	$t_{rr}$	-	9	-	ns
Body Diode Reverse Recovery Charge at $I_S = 2 \text{ A}$ , $di/dt = 100 \text{ A} / \mu\text{s}$	$Q_{rr}$	-	5	-	nC



## Electrical Characteristics Curves

Fig. 1 Typical Output Characteristic

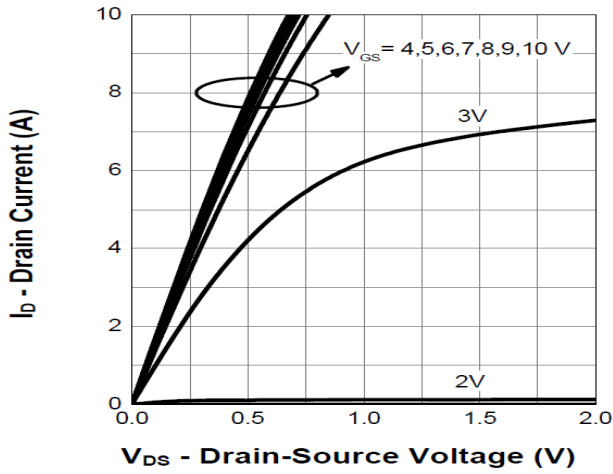


Fig. 2 on-Resistance vs. Gate Voltage

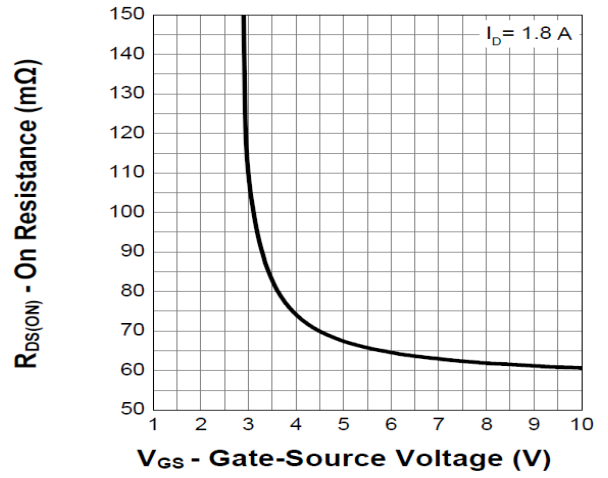


Fig. 3 On-Resistance vs. Drain Current

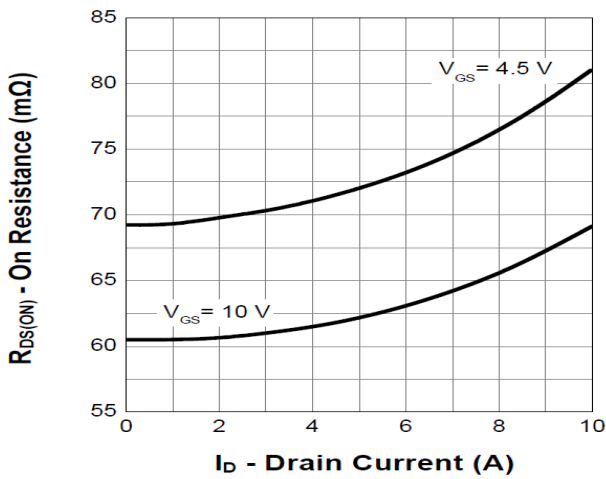


Fig. 4 Gate Threshold Variation vs.  $T_j$

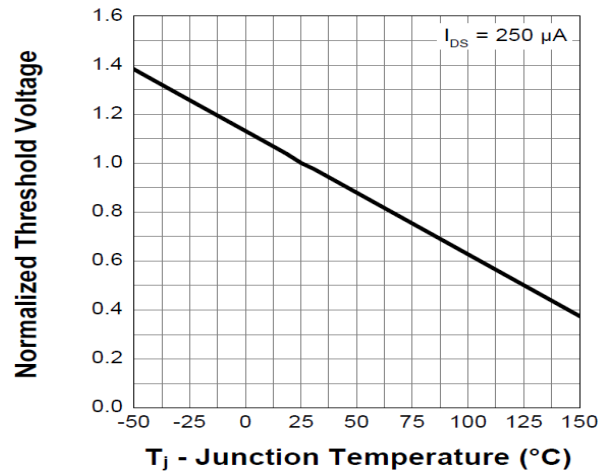


Fig. 5 on-Resistance vs.  $T_j$

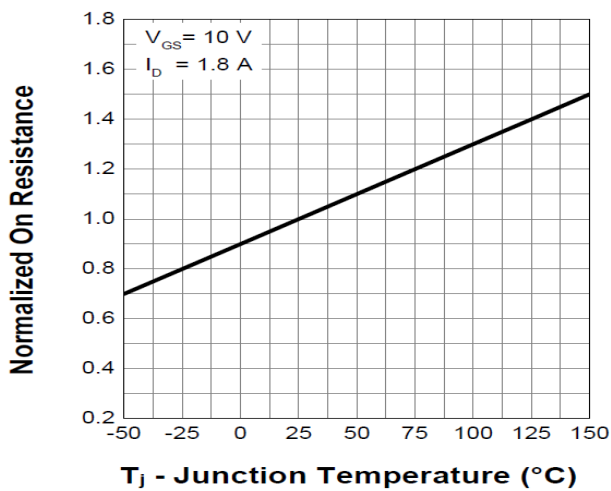
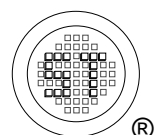
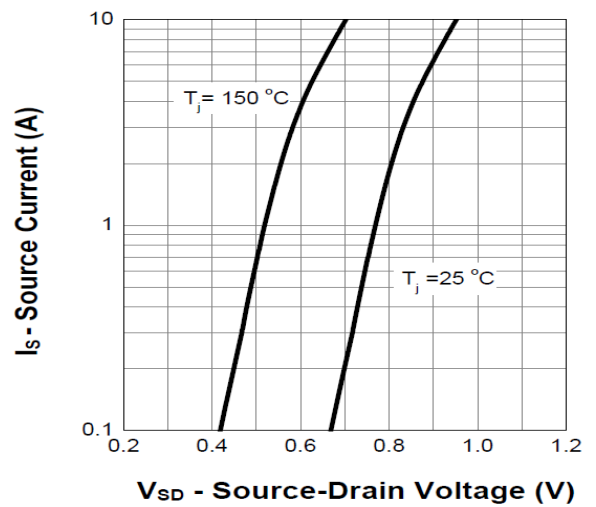


Fig. 6 Typical Forward Characteristic



## Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

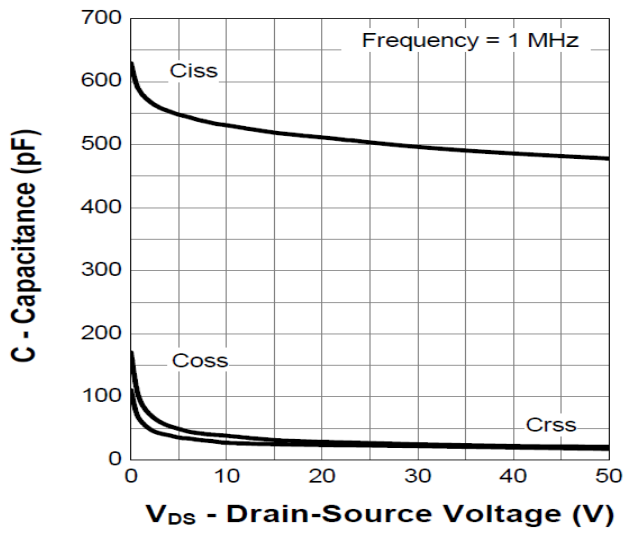
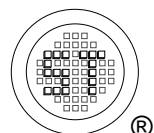
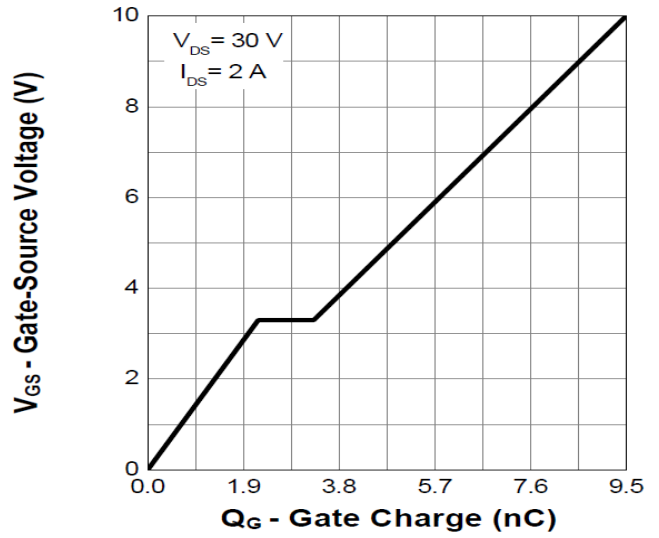


Fig. 8 Gate Charge



## Test Circuits

Fig.1-1 Switching times test circuit

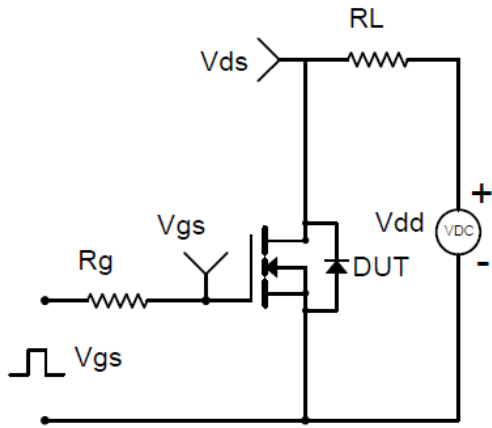


Fig.1-2 Switching Waveform

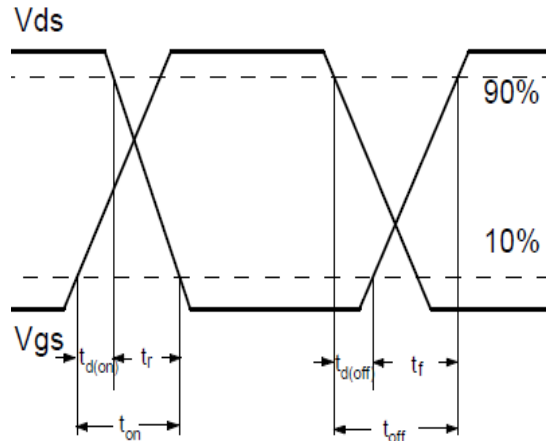


Fig.2-1 Gate charge test circuit

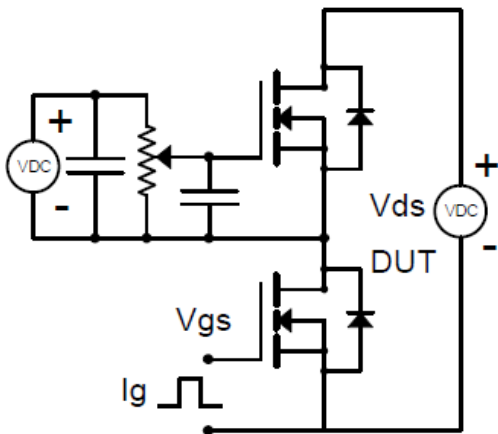
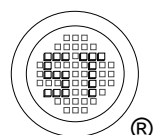
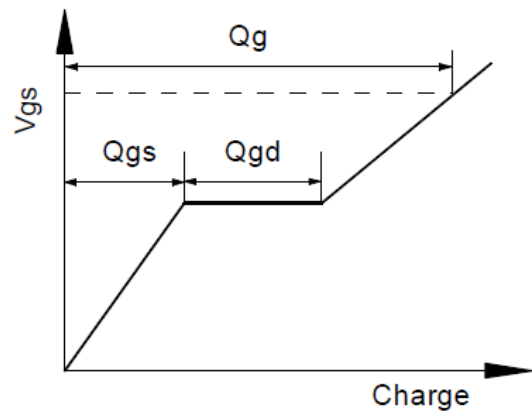


Fig.2-2 Gate charge waveform

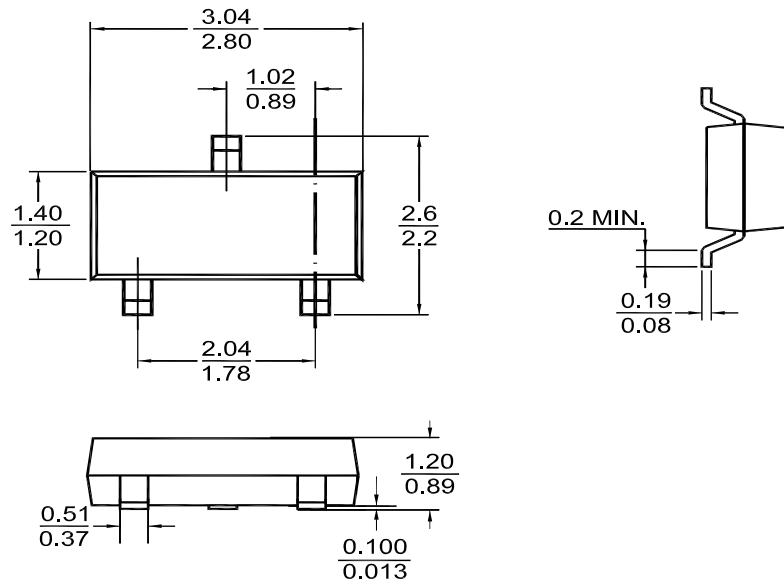


# MMFTN6140

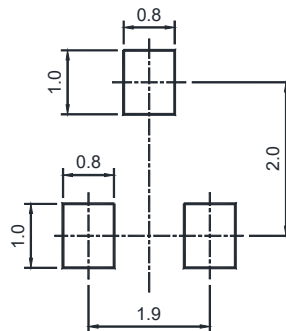
## PACKAGE OUTLINE

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

## Marking information

" WJ " = Part No.  
 "YM" = Date Code Marking  
 "Y" = Year  
 "M" = Month  
 Font type: Arial

