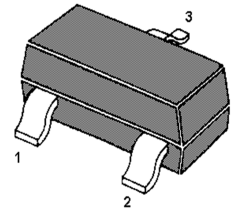
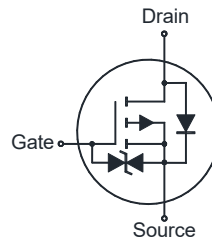


MMFTP2035K-HAF

P-Channel Enhancement Mode MOSFET

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Halogen and Antimony Free(HAF), RoHS compliant



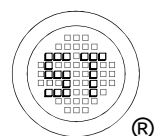
1. Gate 2. Source 3. Drain
TO-236 Plastic Package

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current ¹⁾	$-I_D$	4	A
		2.9	
	$T_a = 25^\circ\text{C}$		
	$T_a = 70^\circ\text{C}$		
Pulsed Drain Current ²⁾	$-I_{DM}$	24	A
Power Dissipation	P_D	0.81	W
Thermal Resistance from Junction to Ambient ¹⁾	$R_{\theta JA}$	154	$^\circ\text{C/W}$
Operating Junction Temperature Range	T_j	- 55 to + 150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^\circ\text{C}$

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

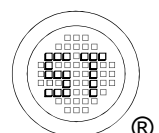
²⁾ Repetitive rating, pulse width limited by junction temperature.



MMFTP2035K-HAF

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $-I_D = 250\ \mu\text{A}$	$-V_{(BR)DSS}$	20	-	-	V
Zero Gate Voltage Drain Current at $-V_{DS} = 20\ \text{V}$	$-I_{DSS}$	-	-	1	μA
Gate-Source Leakage at $-V_{GS} = \pm 8\ \text{V}$	I_{GSS}	-	-	± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250\ \mu\text{A}$	$-V_{GS(th)}$	0.4	-	1	V
Drain-Source On-State Resistance at $-V_{GS} = 4.5\ \text{V}$, $-I_D = 3\ \text{A}$ at $-V_{GS} = 2.5\ \text{V}$, $-I_D = 2\ \text{A}$ at $-V_{GS} = 1.8\ \text{V}$, $-I_D = 1\ \text{A}$	$R_{DS(on)}$	- - -	- - -	35 45 62	$\text{m}\Omega$
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS} = 5\ \text{V}$, $-I_D = 3\ \text{A}$	g_{fs}	-	14	-	S
Input Capacitance at $-V_{DS} = 10\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	816	-	pF
Output Capacitance at $-V_{DS} = 10\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	213	-	pF
Reverse Transfer Capacitance at $-V_{DS} = 10\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	83	-	pF
Total Gate Charge at $-V_{DS} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$	Q_g	-	12.5	-	nC
Gate Source Charge at $-V_{DS} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$	Q_{gs}	-	1.6	-	nC
Gate Drain Charge at $-V_{DS} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$	Q_{gd}	-	2.8	-	nC
Turn-On Delay Time at $-V_{DD} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$, $R_G = 4.5\ \Omega$, $R_L = 3.33\ \Omega$	$t_{d(on)}$	-	86	-	ns
Turn-On Rise Time at $-V_{DD} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$, $R_G = 4.5\ \Omega$, $R_L = 3.33\ \Omega$	t_r	-	51	-	ns
Turn-Off Delay Time at $-V_{DD} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$, $R_G = 4.5\ \Omega$, $R_L = 3.33\ \Omega$	$t_{d(off)}$	-	185	-	ns
Turn-Off Fall Time at $-V_{DD} = 10\ \text{V}$, $-I_D = 3\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$, $R_G = 4.5\ \Omega$, $R_L = 3.33\ \Omega$	t_f	-	1050	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 3\ \text{A}$	$-V_{SD}$	-	-	1.2	V
Body Diode Reverse Recovery Time at $-I_F = 3\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$	t_{rr}	-	0.9	-	μs
Body Diode Reverse Recovery Charge at $-I_F = 3\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$	Q_{rr}	-	6.3	-	μC



Electrical Characteristics Curves

Fig. 1 Output Characteristic

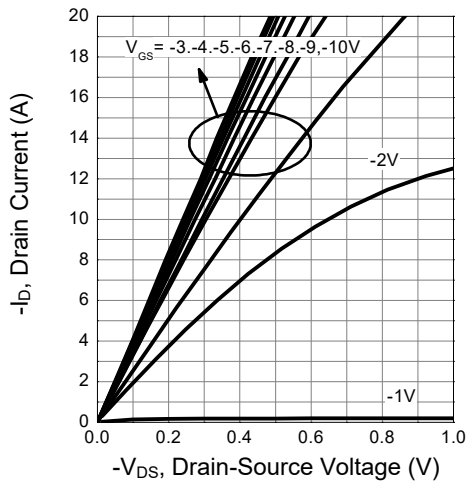


Fig. 2 Transfer Characteristics

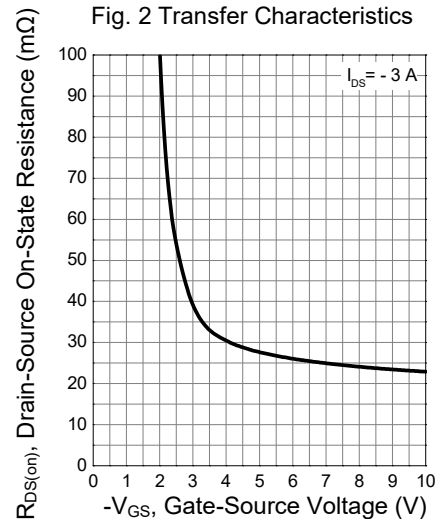


Fig. 3 on-Resistance vs. Drain Current

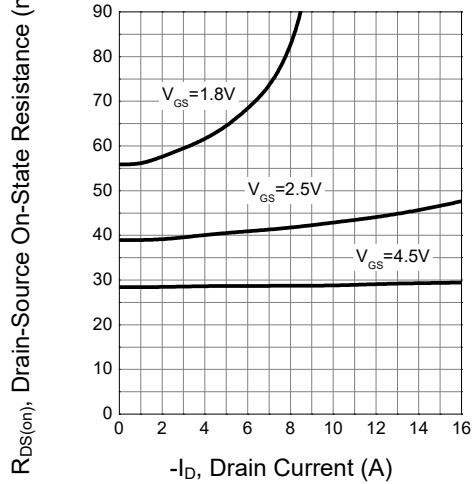


Fig. 4 $V_{GS(th)}$ vs T_j

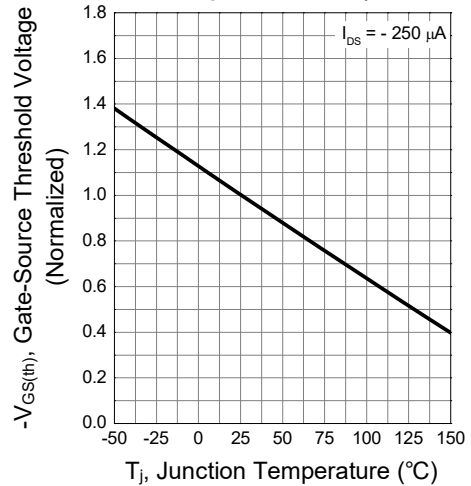


Fig. 5 $R_{DS(on)}$ vs. T_j

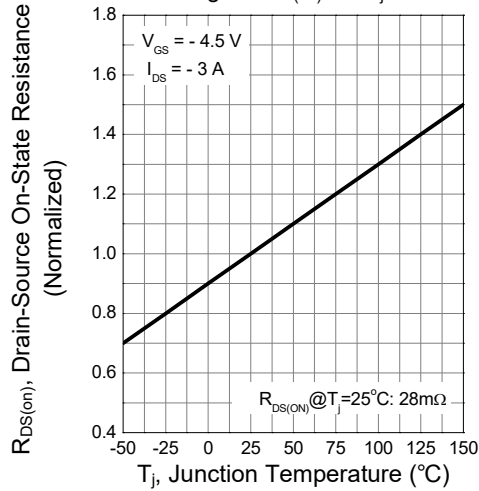
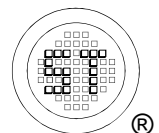
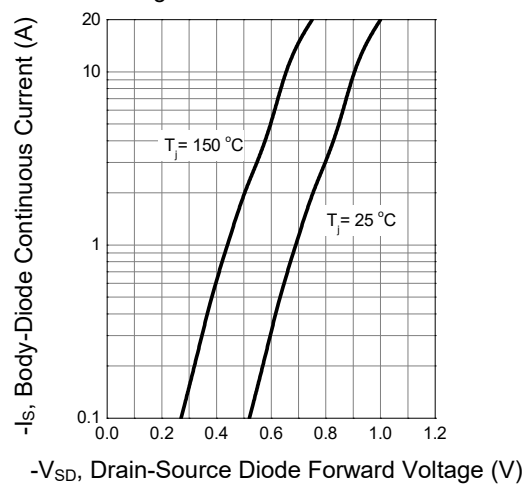
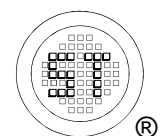
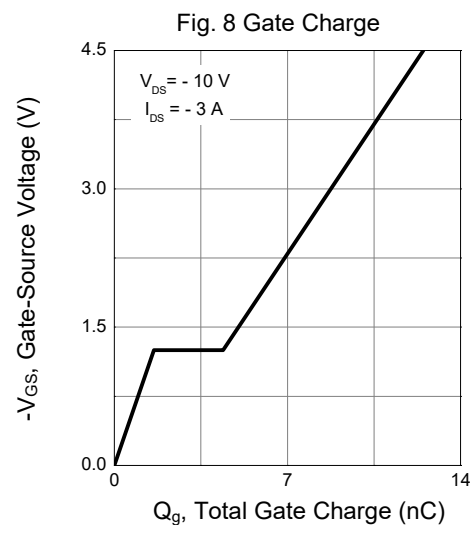
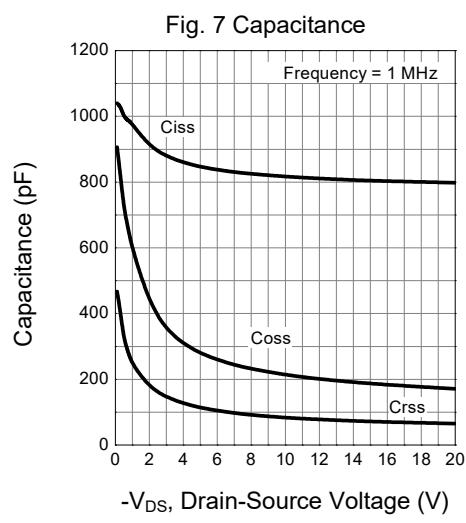


Fig. 6 Diode Forward



Electrical Characteristics Curves



Test Circuits

Fig.1-1 Switching times test circuit

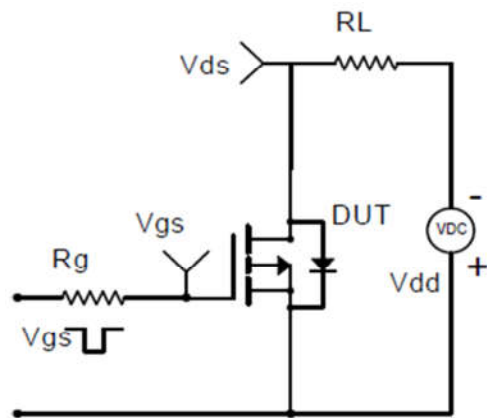


Fig.1-2 Switching Waveform

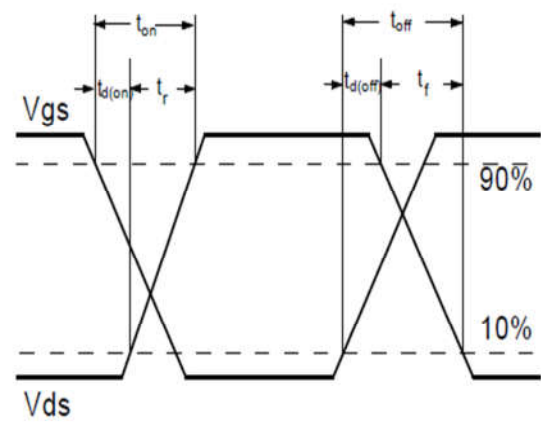


Fig.2-1 Gate charge test circuit

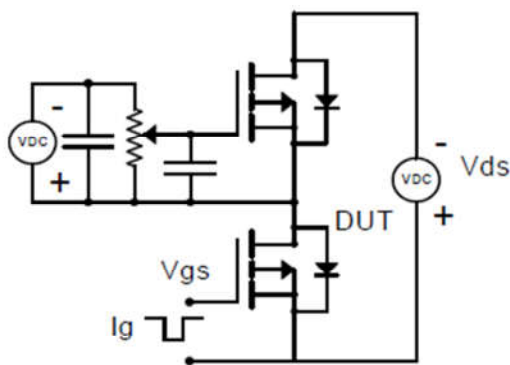
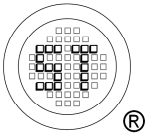
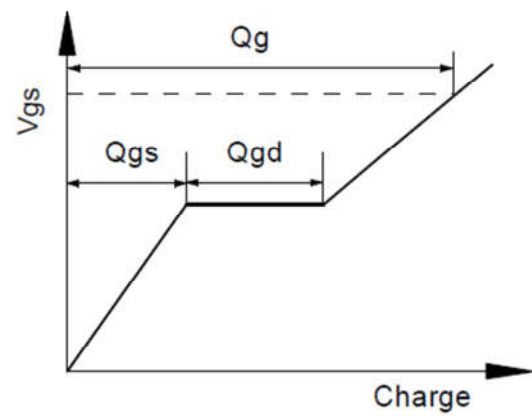


Fig.2-2 Gate charge waveform

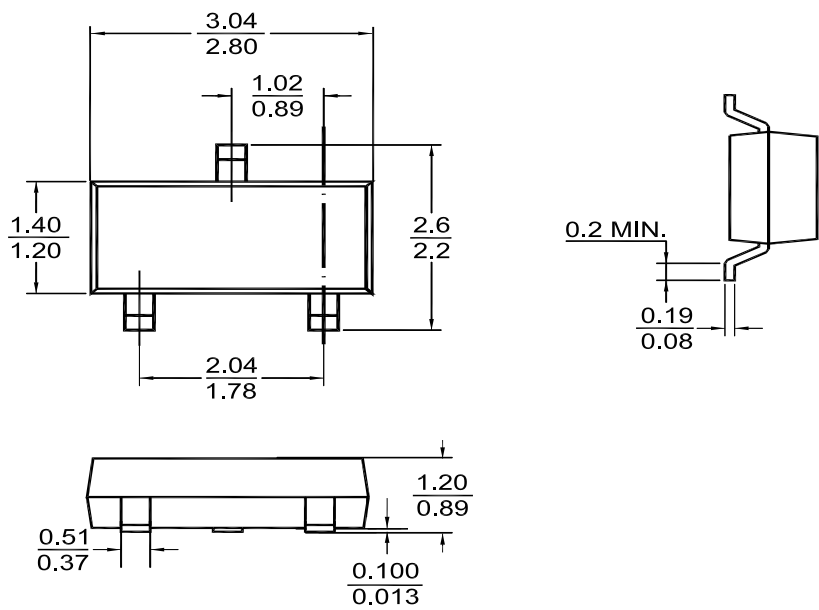


MMFTP2035K-HAF

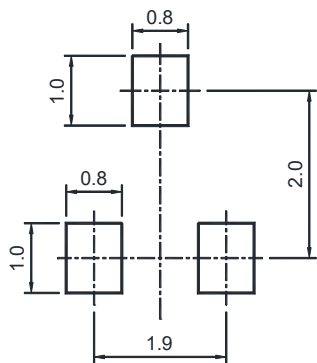
PACKAGE OUTLINE

Plastic surface mounted package (Dimensions in mm)

TO-236



Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
TO-236	8	4 ± 0.1	0.157 ± 0.004	178	7	3,000

Marking information

" VB " = Part No.
" . " = HAF (Halogen and Antimony Free)
"YM" = Date Code Marking
"Y" = Year
"M" = Month
Font type: Arial

