

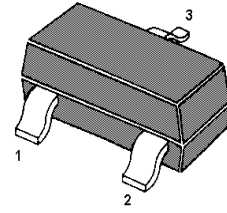
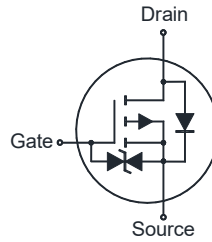
MMFTP2305AK

P-Channel Enhancement Mode MOSFET

Features

- Advanced trench cell design
- Typical ESD Protection HBM Class 1B

Classification	Voltage Range(V)
0A	< 125
0B	125 to < 250
1A	250 to < 500
1B	500 to < 1000
1C	1000 to < 2000
2	2000 to < 4000
3A	4000 to < 8000
3B	≥ 8000



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

Applications

- Battery management
- High speed switch
- Portable appliances
- Low power DC to DC Converter

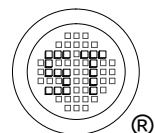
Absolute Maximum Ratings($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	$-I_D$	4.2	A
Pulsed Drain Current ($t_p = 300 \mu\text{s}$)	$-I_{DM}$	10	A
Power Dissipation	P_{tot}	1.38	W
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Ambient ¹⁾	$R_{\theta JA}$	90	$^\circ\text{C/W}$

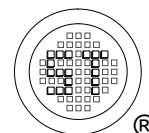
¹⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.



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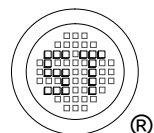
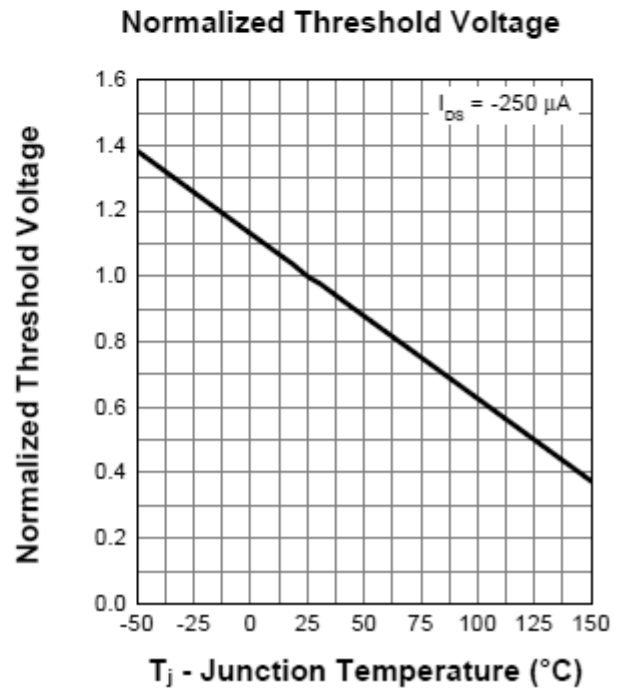
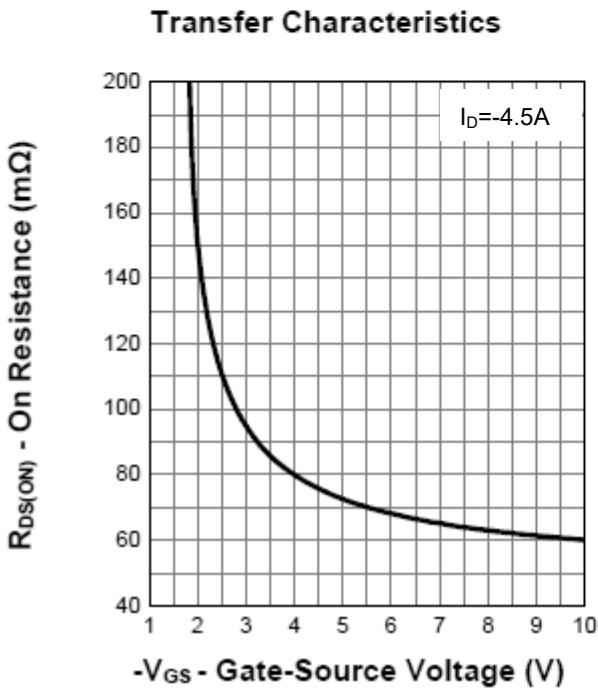
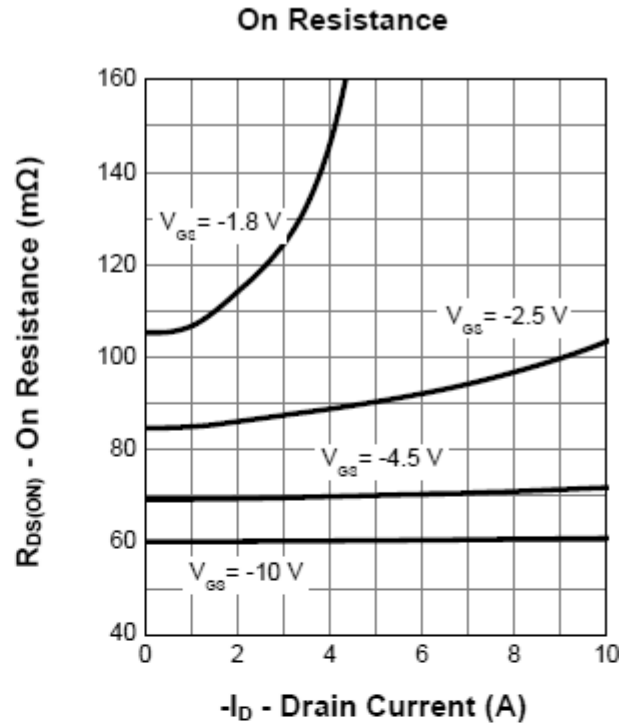
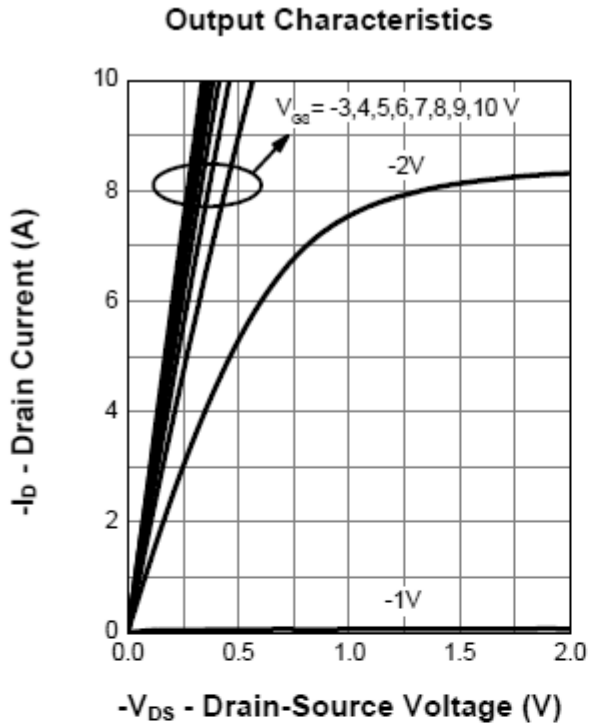
Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

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 $-V_{DS} = 16 \text{ V}$	$-I_{DSS}$	-	-	1	μA
Gate-Source Leakage at $V_{GS} = \pm 12 \text{ V}$	I_{GSS}	-	-	± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250 \mu\text{A}$	$-V_{GS(th)}$	0.5	-	1.2	V
Drain-Source On-State Resistance at $-V_{GS} = 10 \text{ V}$, $-I_D = 4.5 \text{ A}$ at $-V_{GS} = 4.5 \text{ V}$, $-I_D = 4.2 \text{ A}$ at $-V_{GS} = 2.5 \text{ V}$, $-I_D = 2 \text{ A}$ at $-V_{GS} = 1.8 \text{ V}$, $-I_D = 1 \text{ A}$	$R_{DS(on)}$	-	-	53 65 100 250	m Ω
DYNAMIC PARAMETERS					
Gate resistance at $V_{DS} = 0 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	R_g	-	17	-	Ω
Input Capacitance at $-V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{iss}	-	840	-	pF
Output Capacitance at $-V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{oss}	-	92	-	pF
Reverse Transfer Capacitance at $-V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{rss}	-	66	-	pF
Total Gate Charge at $-V_{DS} = 10 \text{ V}$, $-I_D = 4.5 \text{ A}$, $-V_{GS} = 10 \text{ V}$	Q_g	-	20	-	nC
Gate Source Charge at $-V_{DS} = 10 \text{ V}$, $-I_D = 4.5 \text{ A}$, $-V_{GS} = 10 \text{ V}$	Q_{gs}	-	2.3	-	nC
Gate Drain Charge at $-V_{DS} = 10 \text{ V}$, $-I_D = 4.5 \text{ A}$, $-V_{GS} = 10 \text{ V}$	Q_{gd}	-	2.2	-	nC
Turn-On Delay Time at $-V_{DS} = 15 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 4.2 \text{ A}$, $R_{GEN} = 6 \Omega$	$t_{d(on)}$	-	8	-	ns
Turn-On Rise Time at $-V_{DS} = 15 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 4.2 \text{ A}$, $R_{GEN} = 6 \Omega$	t_r	-	19	-	ns
Turn-Off Delay Time at $-V_{DS} = 15 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 4.2 \text{ A}$, $R_{GEN} = 6 \Omega$	$t_{d(off)}$	-	39	-	ns
Turn-Off Fall Time at $-V_{DS} = 15 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 4.2 \text{ A}$, $R_{GEN} = 6 \Omega$	t_f	-	7	-	ns
Body-Diode PARAMETERS					
Body Diode Voltage at $-I_S = 1.2 \text{ A}$, $V_{GS} = 0 \text{ V}$	$-V_{SD}$	-	-	1.2	V
Body Diode Reverse Recovery Time at $-I_S = 4.2 \text{ A}$, $di/dt = 100 \text{ A} / \mu\text{s}$	t_{rr}	-	29	-	ns
Body Diode Reverse Recovery Charge at $-I_S = 4.2 \text{ A}$, $di/dt = 100 \text{ A} / \mu\text{s}$	Q_{rr}	-	8	-	nC



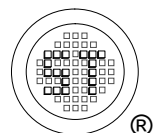
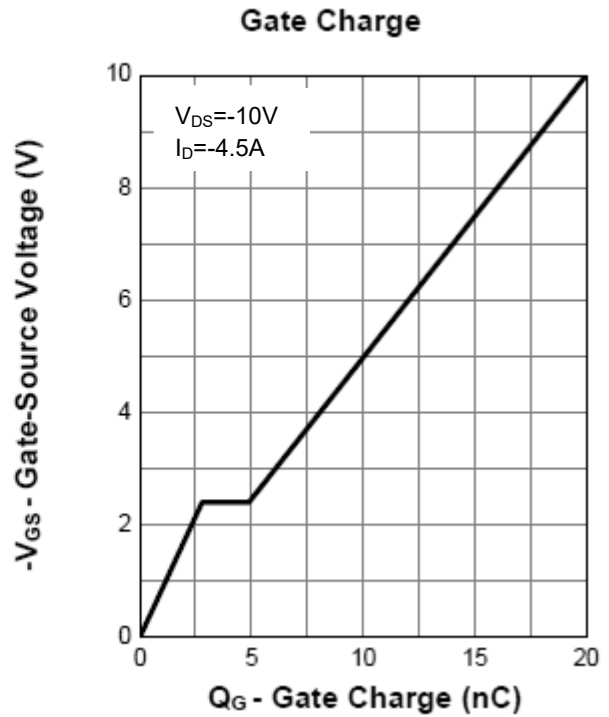
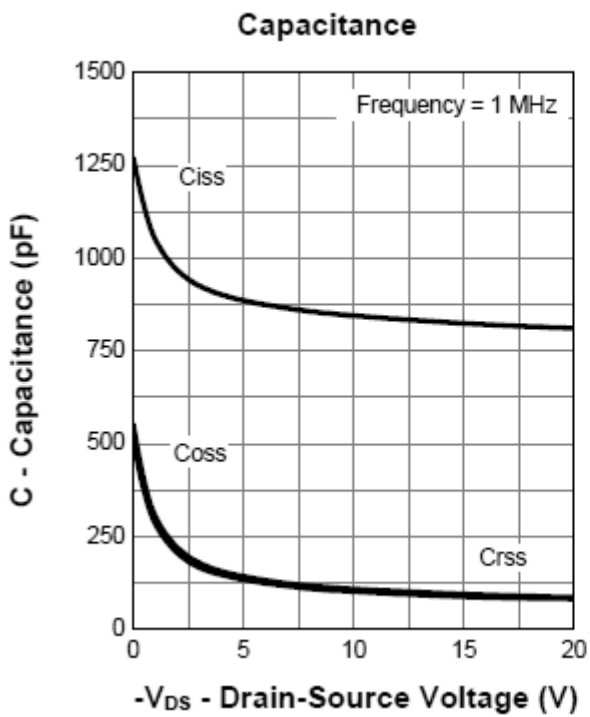
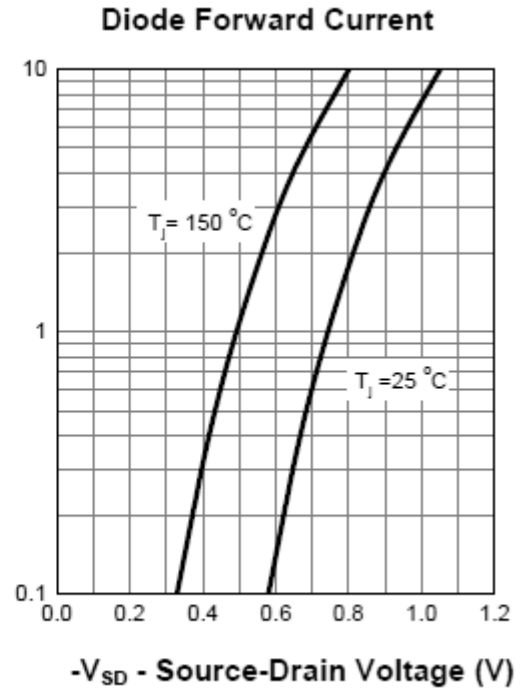
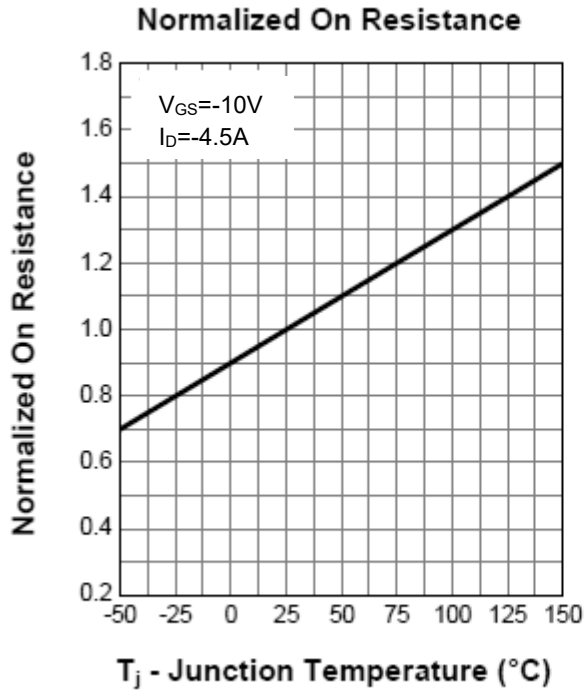
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Electrical Characteristics Curves



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Electrical Characteristics Curves



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Test Circuits

Fig.1-1 Switching times test circuit

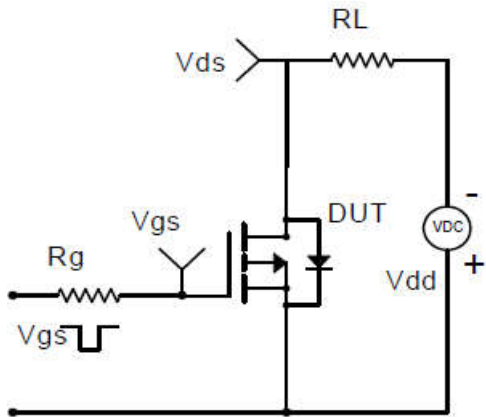


Fig.1-2 Switching Waveform

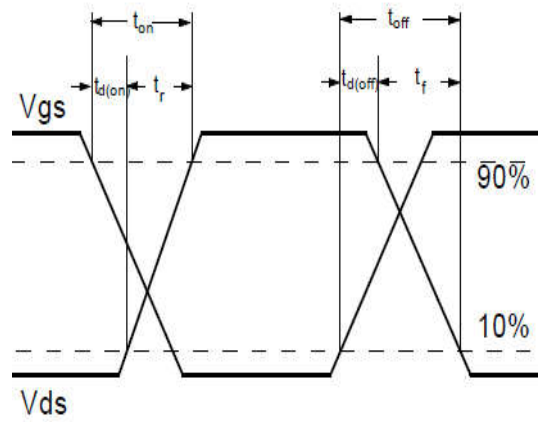


Fig.2-1 Gate charge test circuit

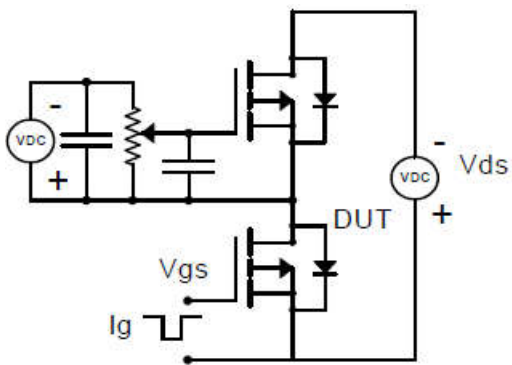
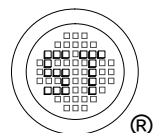
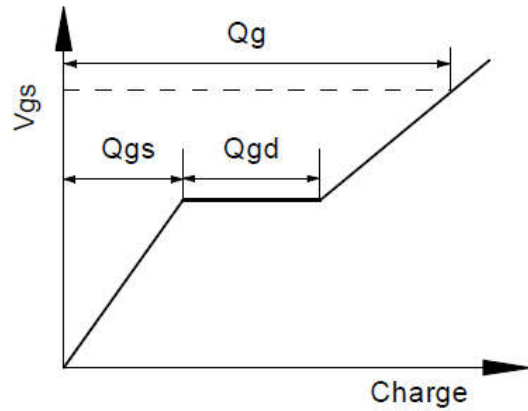


Fig.2-2 Gate charge waveform

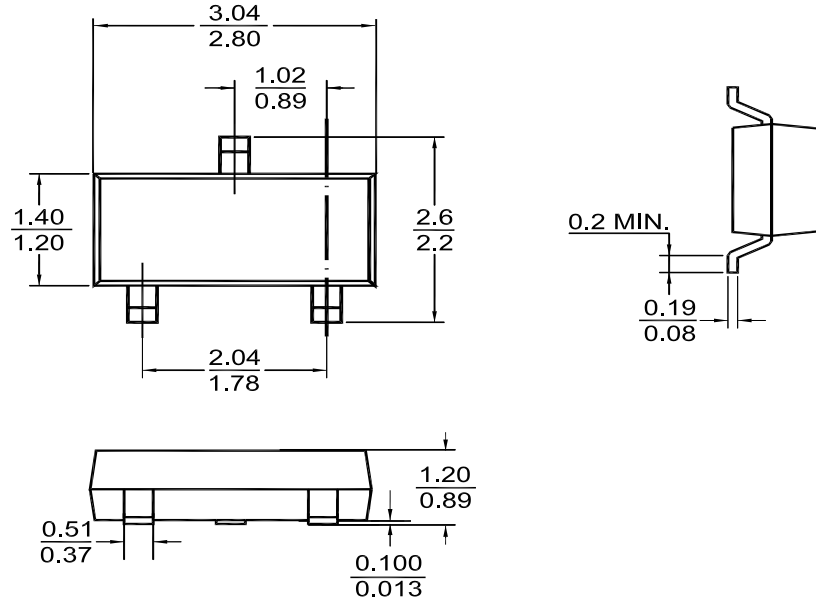


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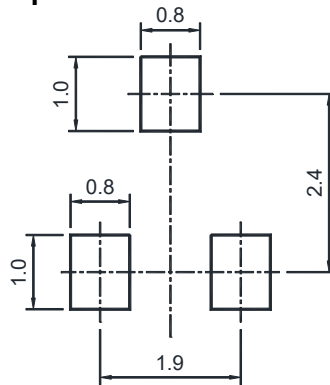
PACKAGE OUTLINE

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

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

