

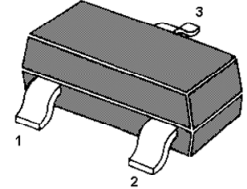
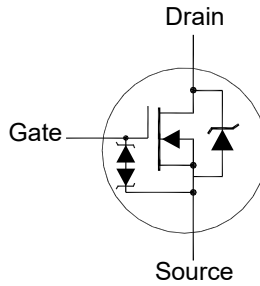
MMFTN501K

N-Channel Depletion Mode MOSFET

Features

- Surface-mounted package
- Built-in G-S Protection Diode
- Typical ESD Protection HBM Class 1A

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

- Switching

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

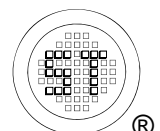
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	I_D	30 24	mA
		$T_C = 25^\circ\text{C}$ $T_C = 70^\circ\text{C}$	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	120	mA
Gate-Source ESD (HBM-C = 100 pF, R = 1.5 K Ω)	$V_{ESD(G-S)}$	300	V
Total Power Dissipation	P_D	500	mW
Operating Junction Temperature Range	T_j	- 55 to + 150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient ²⁾	$R_{\theta JA}$	250	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width $\leq 100 \mu\text{s}$, Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{j(MAX)}$.

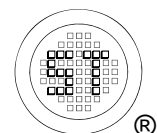
²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.



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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 $V_{GS} = -5\text{ V}$, $I_D = 250\ \mu\text{A}$	BV_{DSX}	600	-	-	V
Gate-Source Breakdown Voltage at $I_{GS} = \pm 1\ \text{mA}$ (Open Drain)	V_{GSO}	30	-	-	V
Gate-Source Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}	-	-	± 10	μA
Drain-Source Leakage Current at $V_{DS} = 600\ \text{V}$, $V_{GS} = -5\ \text{V}$	I_{DSX}	-	-	0.1	μA
Gate-Source Threshold Voltage at $V_{DS} = 3\ \text{V}$, $I_D = 8\ \mu\text{A}$	$V_{GS(th)}$	-2.7	-	-1	V
Drain-Source On-State Resistance at $V_{GS} = 0\ \text{V}$, $I_D = 3\ \text{mA}$ at $V_{GS} = 10\ \text{V}$, $I_D = 16\ \text{mA}$	$R_{DS(ON)}$	-	-	500 500	Ω
DYNAMIC PARAMETERS					
Input Capacitance at $-V_{GS} = 5\ \text{V}$, $V_{DS} = 25\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	10	-	pF
Output Capacitance at $-V_{GS} = 5\ \text{V}$, $V_{DS} = 25\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	2.9	-	pF
Reverse Transfer Capacitance at $-V_{GS} = 5\ \text{V}$, $V_{DS} = 25\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	0.12	-	pF
Total Gate Charge at $V_{GS} = -5\sim 7\ \text{V}$, $V_{DS} = 400\ \text{V}$, $I_D = 10\ \text{mA}$	Q_g	-	2.8	-	nC
Gate-Source Charge at $V_{GS} = -5\sim 7\ \text{V}$, $V_{DS} = 400\ \text{V}$, $I_D = 10\ \text{mA}$	Q_{gs}	-	0.55	-	nC
Gate-Drain Charge at $V_{GS} = -5\sim 7\ \text{V}$, $V_{DS} = 400\ \text{V}$, $I_D = 10\ \text{mA}$	Q_{gd}	-	1.6	-	nC
Turn-On Delay Time at $V_{DD} = 300\ \text{V}$, $I_D = 10\ \text{mA}$, $V_{GS} = -5\sim 7\ \text{V}$, $R_G = 6\ \Omega$	$t_{d(on)}$	-	12	-	ns
Turn-On Rise Time at $V_{DD} = 300\ \text{V}$, $I_D = 10\ \text{mA}$, $V_{GS} = -5\sim 7\ \text{V}$, $R_G = 6\ \Omega$	t_r	-	60	-	ns
Turn-Off Delay Time at $V_{DD} = 300\ \text{V}$, $I_D = 10\ \text{mA}$, $V_{GS} = -5\sim 7\ \text{V}$, $R_G = 6\ \Omega$	$t_{d(off)}$	-	25	-	ns
Turn-Off Fall Time at $V_{DD} = 300\ \text{V}$, $I_D = 10\ \text{mA}$, $V_{GS} = -5\sim 7\ \text{V}$, $R_G = 6\ \Omega$	t_f	-	100	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 16\ \text{mA}$, $-V_{GS} = 5\ \text{V}$	V_{SD}	-	-	1.2	V
Body Diode Reverse Recovery Time at $V_R = 300\ \text{V}$, $I_S = 10\ \text{mA}$, $di/dt = 100\ \text{A}/\mu\text{s}$	t_{rr}	-	-	367	ns
Body Diode Reverse Recovery Charge at $V_R = 300\ \text{V}$, $I_S = 10\ \text{mA}$, $di/dt = 100\ \text{A}/\mu\text{s}$	Q_{rr}	-	-	963	nC



Electrical Characteristics Curves

Fig. 1 Output Characteristics

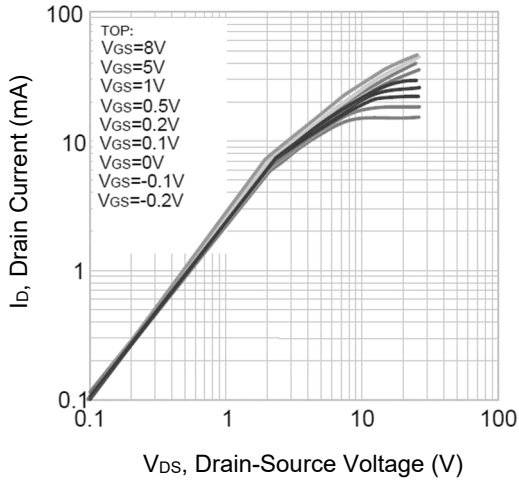


Fig. 2 Transfer Characteristics

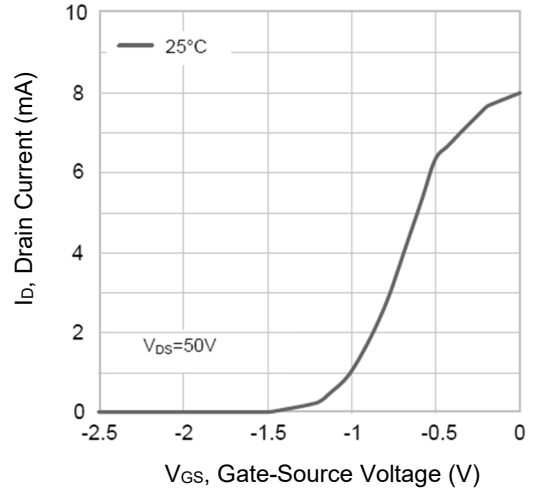


Fig. 3 on-Resistance vs. Drain Current

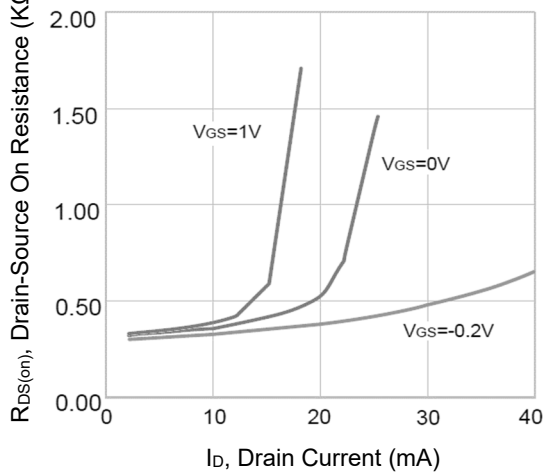
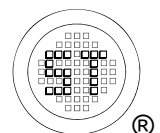
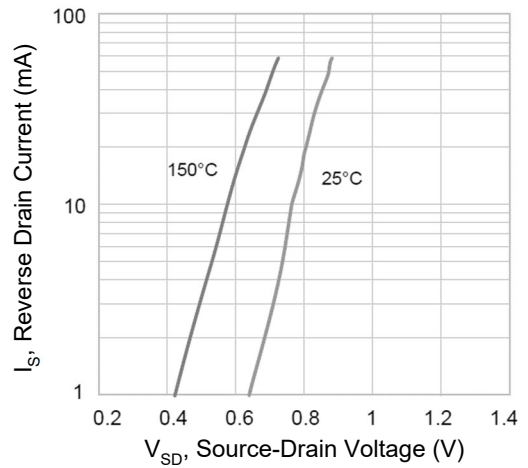
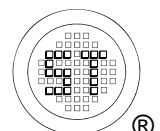
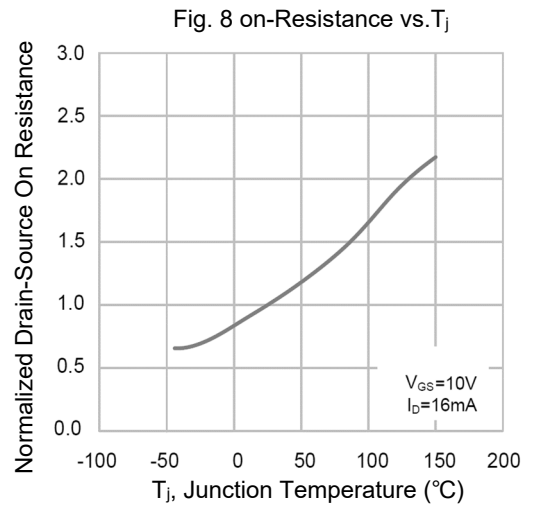
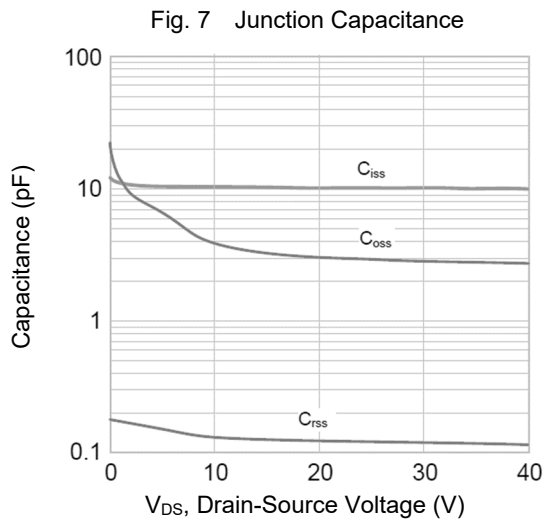
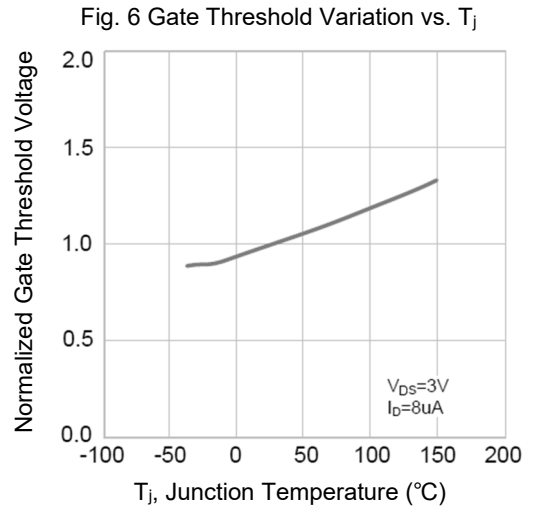
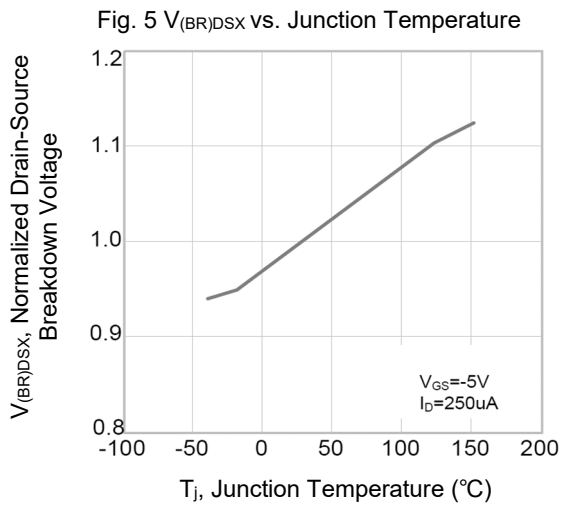


Fig. 4 Diode Forward



Electrical Characteristics Curves



Test Circuits

Fig.1-1 Switching times test circuit

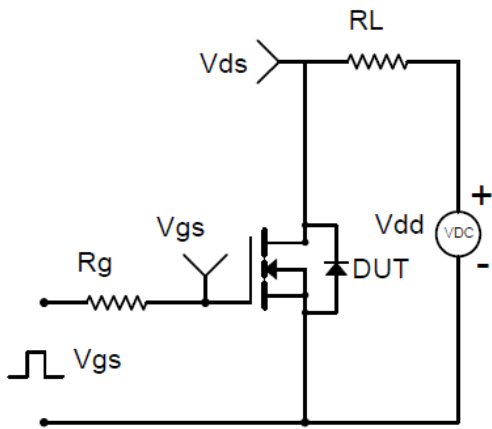


Fig.1-2 Switching Waveform

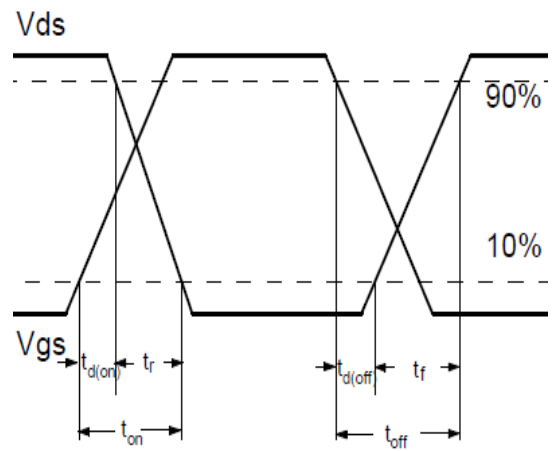


Fig.2-1 Gate charge test circuit

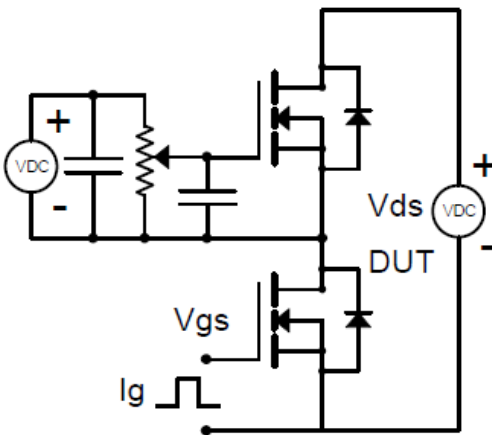
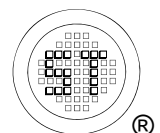
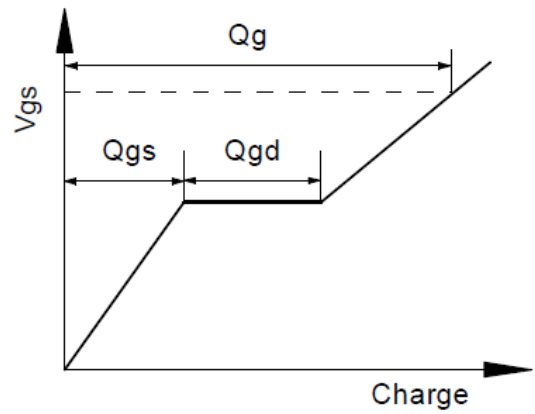


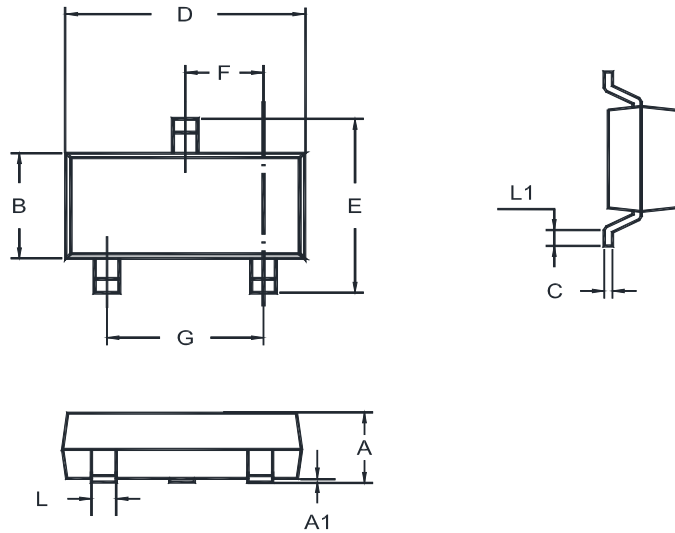
Fig.2-2 Gate charge waveform



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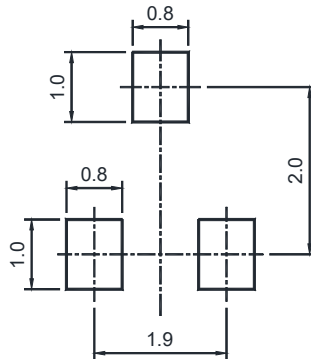
Package Outline (Dimensions in mm)

SOT-23



Unit	A	A1	B	C	D	E	F	G	L	L1
mm	1.20	0.100	1.40	0.19	3.04	2.6	1.02	2.04	0.51	0.2
	0.89	0.013	1.20	0.08	2.80	2.2	0.89	1.78	0.37	MIN

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

- " 5H " = Part No.
- " YM " = Date Code Marking
- " Y " = Year
- " M " = Month
- Font type: Arial

