

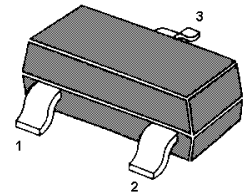
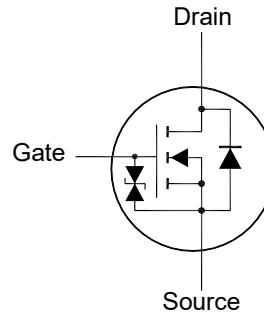
MMFTN0253K-AH

N-Channel Enhancement Mode MOSFET

Features

- AEC-Q101 is Qualified
- Halogen and Antimony Free(HAF),
RoHS compliant
- 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
TO-236 Plastic Package

Applications

- Portable appliances
- Battery management

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

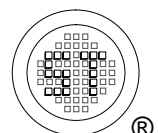
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current	I_D	2.5	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	10	A
Power Dissipation	P_{tot}	1	W
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient ²⁾	$R_{\theta JA}$	125	$^\circ\text{C/W}$

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

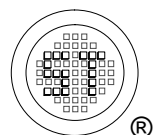
²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.



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

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250\ \mu\text{A}$	BV_{DSS}	30	-	-	V
Drain-Source Leakage Current at $V_{DS} = 30\ \text{V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current 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	-	1.5	V
Drain-Source On-State Resistance at $V_{GS} = 4.5\ \text{V}$, $I_D = 2.5\ \text{A}$ at $V_{GS} = 4\ \text{V}$, $I_D = 2.5\ \text{A}$ at $V_{GS} = 2.5\ \text{V}$, $I_D = 2.5\ \text{A}$	$R_{DS(on)}$	- - -	- - -	92 98 133	$\text{m}\Omega$
DYNAMIC PARAMETERS					
Gate Resistance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g	-	1.5	-	$\text{K}\Omega$
Input Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	387	-	pF
Output Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	37	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	10	-	pF
Total Gate Charge at $V_{GS} = 10\ \text{V}$, $V_{DS} = 15\ \text{V}$, $I_D = 2.5\ \text{A}$	Q_g	-	14	-	nC
Gate-Source Charge at $V_{GS} = 10\ \text{V}$, $V_{DS} = 15\ \text{V}$, $I_D = 2.5\ \text{A}$	Q_{gs}	-	1.2	-	nC
Gate-Drain Charge at $V_{GS} = 10\ \text{V}$, $V_{DS} = 15\ \text{V}$, $I_D = 2.5\ \text{A}$	Q_{gd}	-	2.6	-	nC
Turn-On Delay Time at $V_{DD} = 15\ \text{V}$, $V_{GS} = 10\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 1\ \Omega$	$t_{d(on)}$	-	1138	-	nS
Turn-On Rise Time at $V_{DD} = 15\ \text{V}$, $V_{GS} = 10\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 1\ \Omega$	t_r	-	68	-	nS
Turn-Off Delay Time at $V_{DD} = 15\ \text{V}$, $V_{GS} = 10\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 1\ \Omega$	$t_{d(off)}$	-	892	-	nS
Turn-Off Fall Time at $V_{DD} = 15\ \text{V}$, $V_{GS} = 10\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 1\ \Omega$	t_f	-	98	-	nS
Body-Diode PARAMETERS					
Diode Forward Voltage at $I_S = 1\ \text{A}$, $V_{GS} = 0\ \text{V}$	V_{SD}	-	-	1.2	V



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Electrical Characteristics Curves

Fig. 1 Typical Output Characteristic

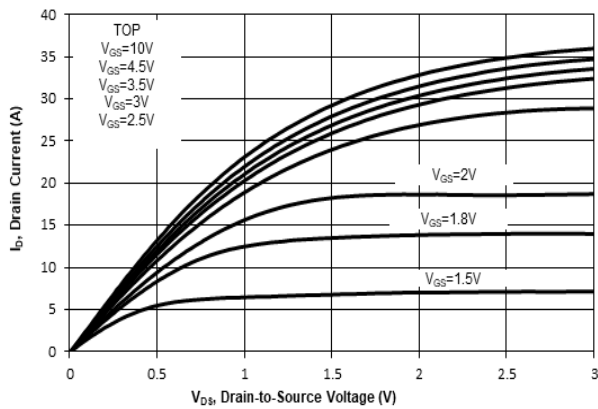


Fig. 2 Typical Transfer Characteristic

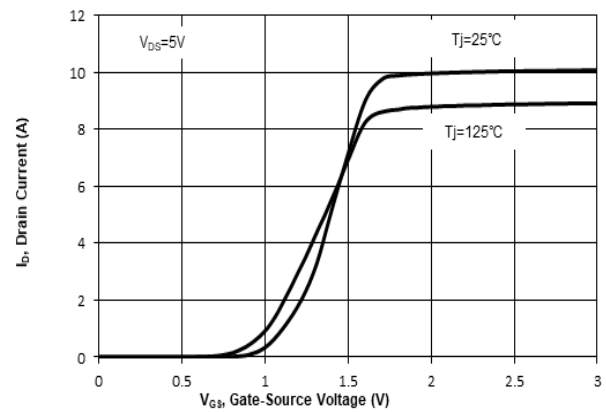


Fig. 3 on-Resistance vs. Drain Current

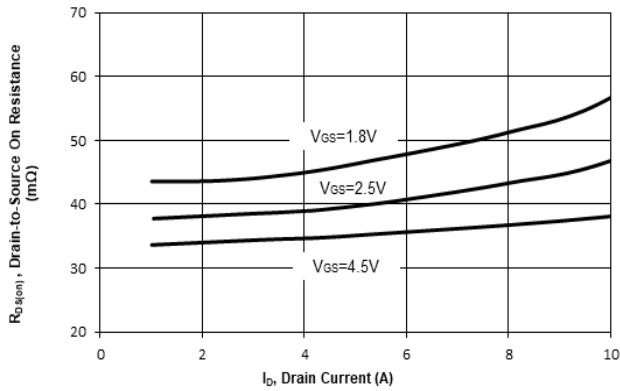


Fig. 4 on-Resistance vs. Gate Voltage

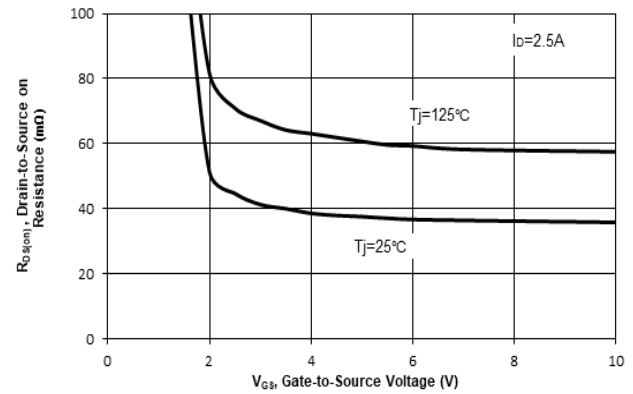


Fig. 5 on-Resistance vs. T_J

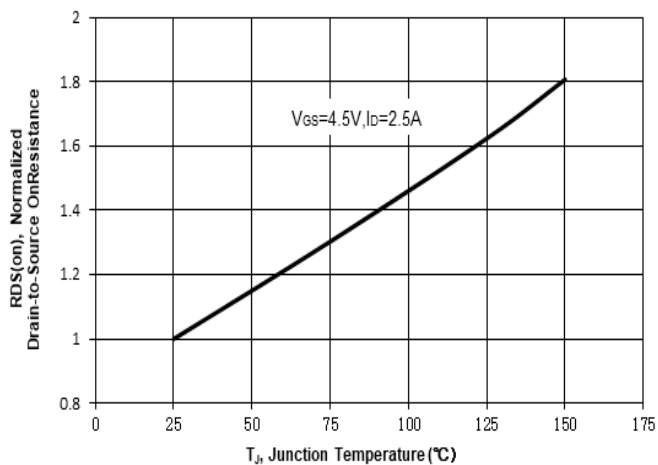
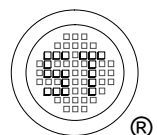
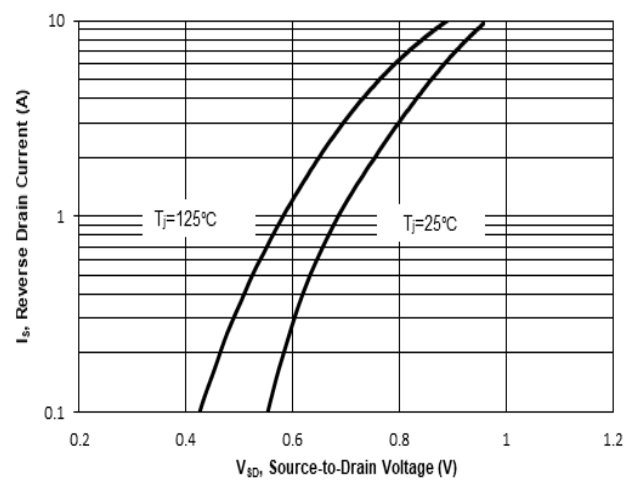


Fig. 6 Typical Forward Characteristic



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Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

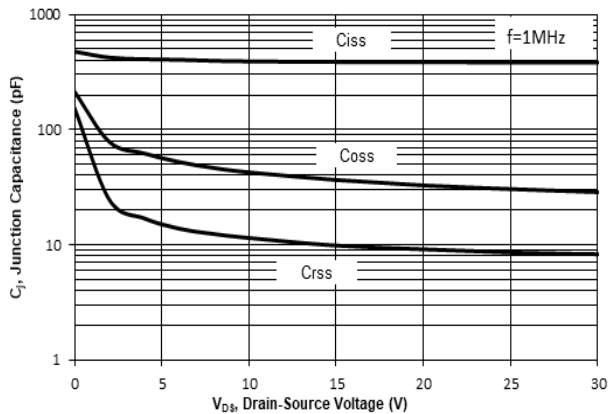


Fig. 8 Drain-Source Leakage Current vs. T_j

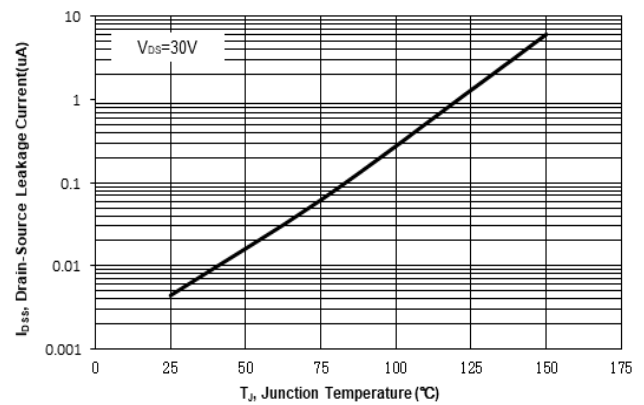


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

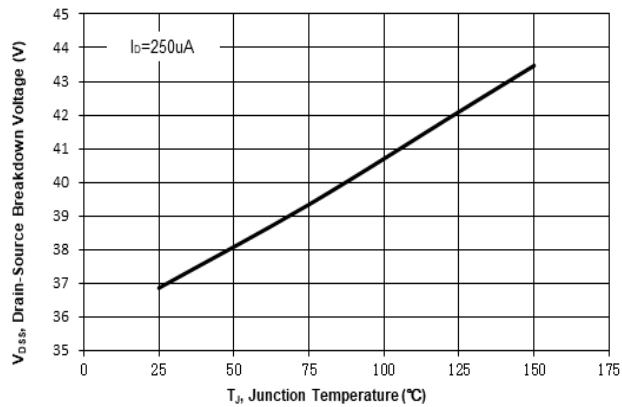


Fig. 10 Gate Threshold Variation vs. T_j

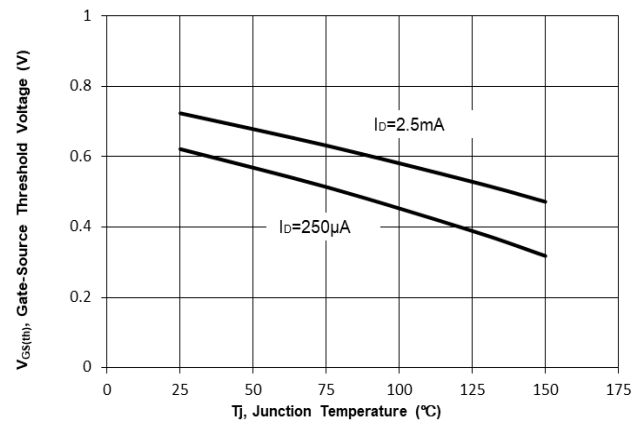
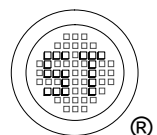
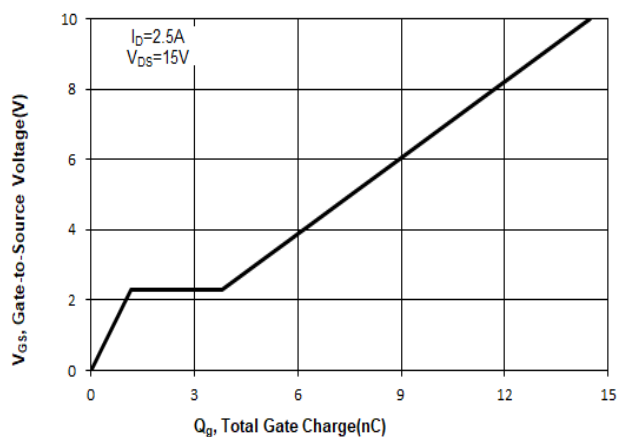


Fig. 11 Gate Charge



Test Circuits

Fig.1-1 Switching times test circuit

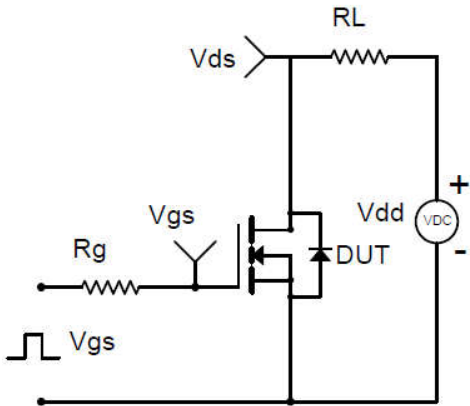


Fig.1-2 Switching Waveform

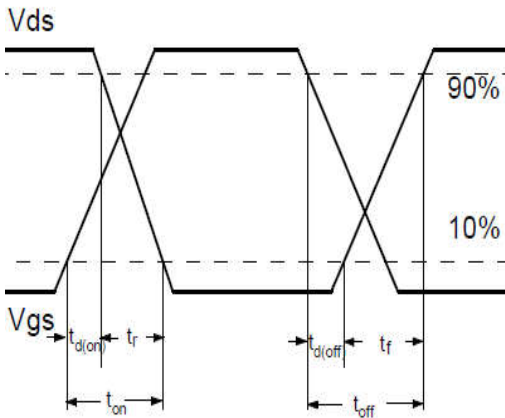


Fig.2-1 Gate charge test circuit

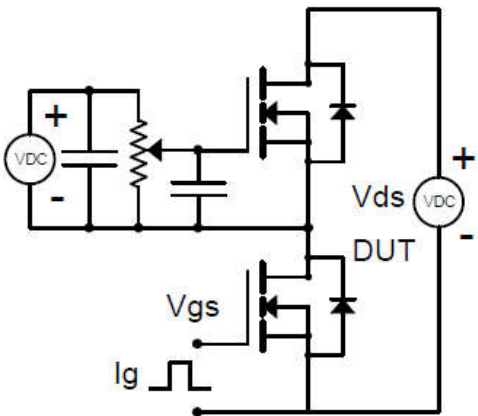
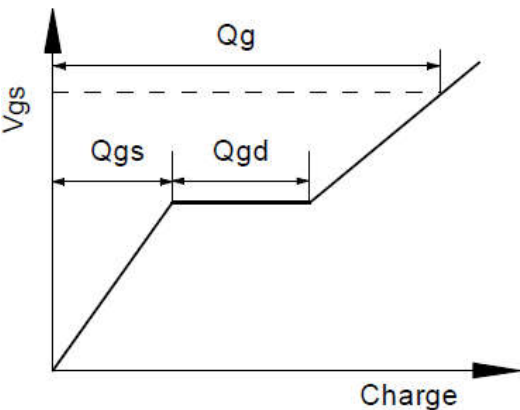


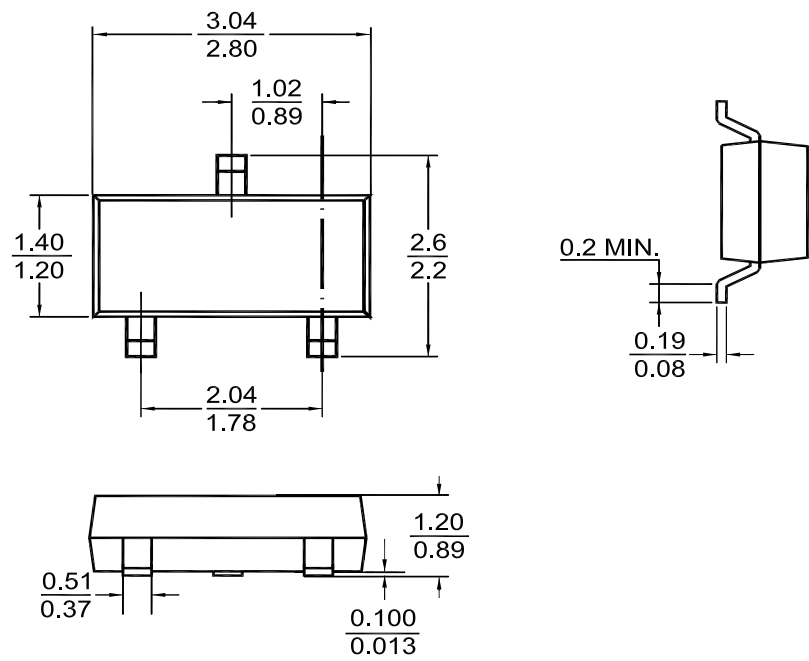
Fig.2-2 Gate charge waveform



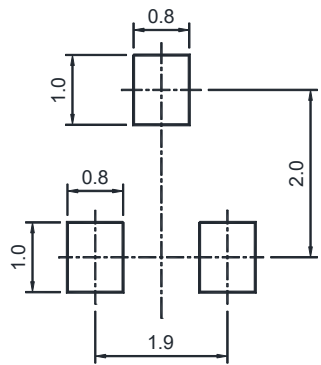
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Package Outline (Dimensions in mm)

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

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

