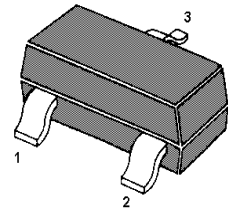
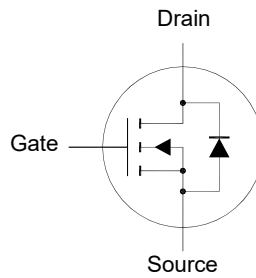


MMFTN3404A-AH

N-Channel Enhancement Mode MOSFET

Features

- Low threshold voltage
- AEC-Q101 Qualified
- Halogen and Antimony Free(HAF),
RoHS compliant



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

Applications

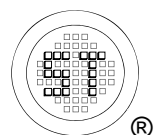
- Portable appliances
- Battery management
- High speed switch

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	I_D	5.6	A
Peak Drain Current ¹⁾	I_{DM}	22	A
Power Dissipation ²⁾	P_{tot}	1.25	W
Thermal Resistance from Junction to Ambient ²⁾	$R_{\theta JA}$	100	$^{\circ}\text{C/W}$
Operating Junction Temperature	T_j	- 55 to + 150	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^{\circ}\text{C}$

¹⁾ Pulse width $\leq 100 \mu\text{s}$, duty cycle $\leq 1 \%$, limited by T_{jmax} .

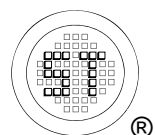
²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.



MMFTN3404A-AH

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250\ \mu\text{A}$	BV_{DSS}	30	-	-	V
Drain-Source Leakage Current at $V_{DS} = 24\ \text{V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	$V_{GS(th)}$	1	-	2.1	V
Drain-Source On-State Resistance at $V_{GS} = 10\ \text{V}$, $I_D = 5.6\ \text{A}$ at $V_{GS} = 4.5\ \text{V}$, $I_D = 3.5\ \text{A}$	$R_{DS(on)}$	- -	- -	23 29	m Ω
DYNAMIC PARAMETERS					
Gate resistance at $V_{DS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g	-	1.8	-	Ω
Input Capacitance at $V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	744	-	pF
Output Capacitance at $V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	77	-	pF
Reverse Transfer Capacitance at $V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	51	-	pF
Total Gate Charge at $V_{DS} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $V_{GS} = 4.5\ \text{V}$ at $V_{DS} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_g	- -	6.7 13.7	- -	nC
Gate Source Charge at $V_{DS} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $V_{GS} = 4.5\ \text{V}$	Q_{gs}	-	2.1	-	nC
Gate Drain Charge at $V_{DS} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $V_{GS} = 4.5\ \text{V}$	Q_{gd}	-	2.7	-	nC
Turn-On Delay Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $R_G = 4.7\ \Omega$	$t_{d(on)}$	-	10.7	-	ns
Turn-On Rise Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $R_G = 4.7\ \Omega$	t_r	-	29	-	ns
Turn-Off Delay Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $R_G = 4.7\ \Omega$	$t_{d(off)}$	-	11	-	ns
Turn-Off Fall Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 15\ \text{V}$, $I_D = 5.6\ \text{A}$, $R_G = 4.7\ \Omega$	t_f	-	2.3	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 1\ \text{A}$	V_{SD}	-	-	1.2	V
Body Diode Reverse Recovery Time at $I_F = 5.6\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	t_{rr}	-	6	-	ns
Body Diode Reverse Recovery Charge at $I_F = 5.6\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	Q_{rr}	-	2	-	nc



Electrical Characteristics Curves

Fig.1 Output Characteristic

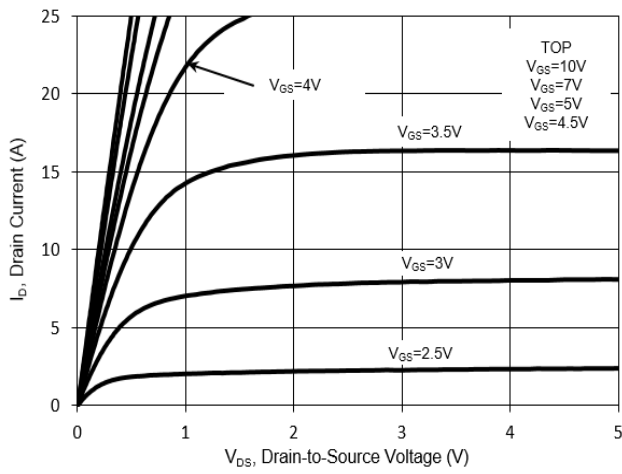


Fig.2 Transfer Characteristic

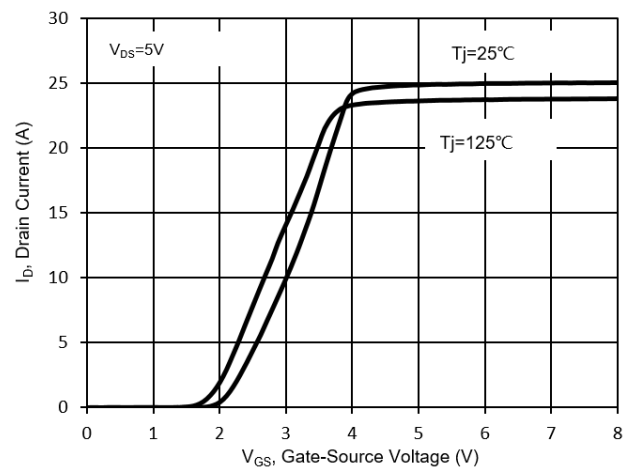


Fig.3 On Resistance vs. Gate-Source

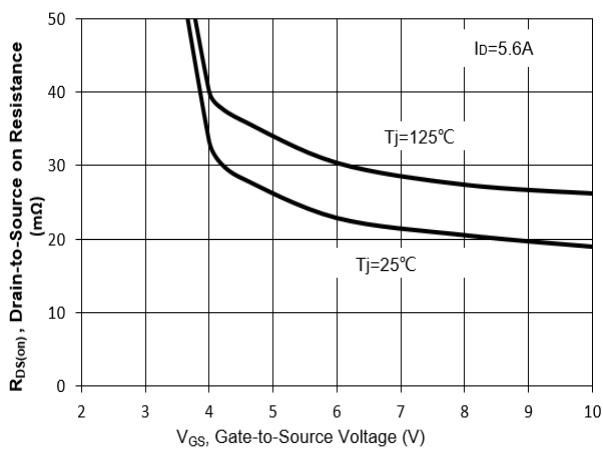


Fig.4 On Resistance vs. Temperature vs. on Resistance

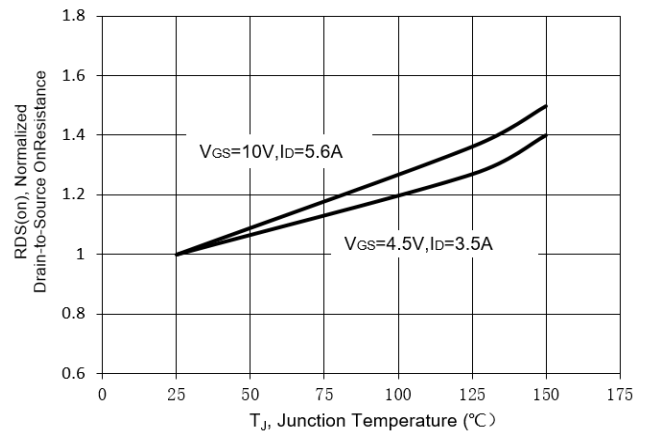


Fig.5 Drain Current vs. on Resistance

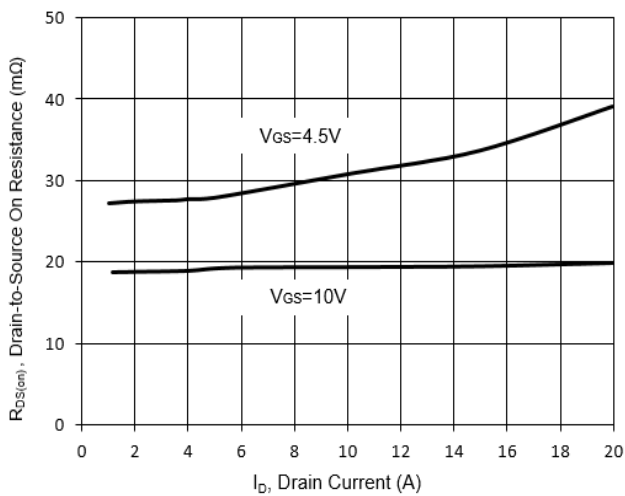
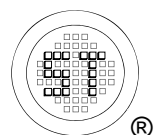
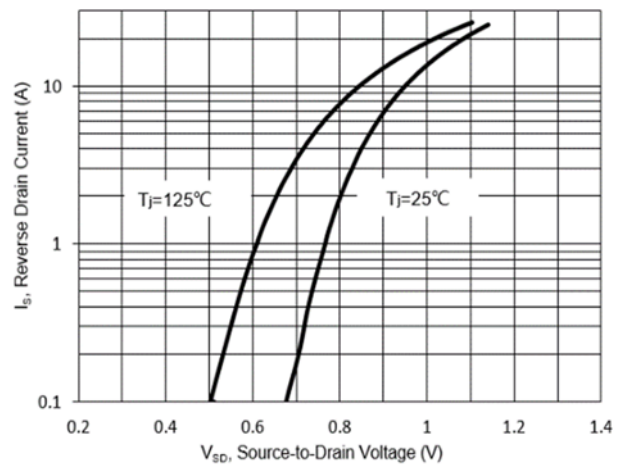


Fig.6 Source-Drain Diode Forward



Electrical Characteristics Curves

Fig.7 Drain Leakage Current Vs T_J

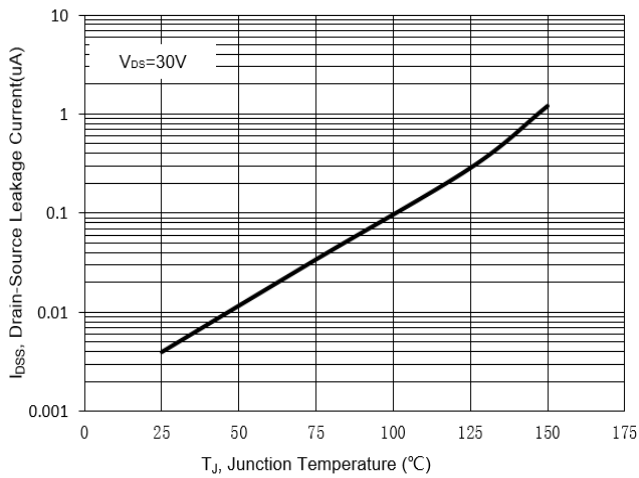


Fig.8 Drain-Source Breakdown Voltage Vs T_J

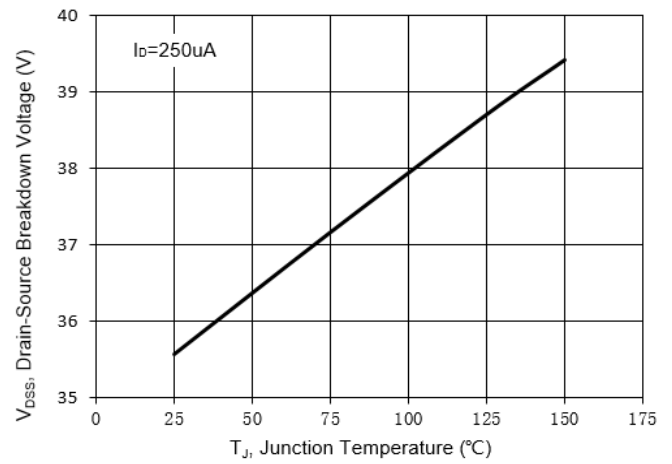


Fig.9 Gate-Source Threshold Voltage Vs T_J

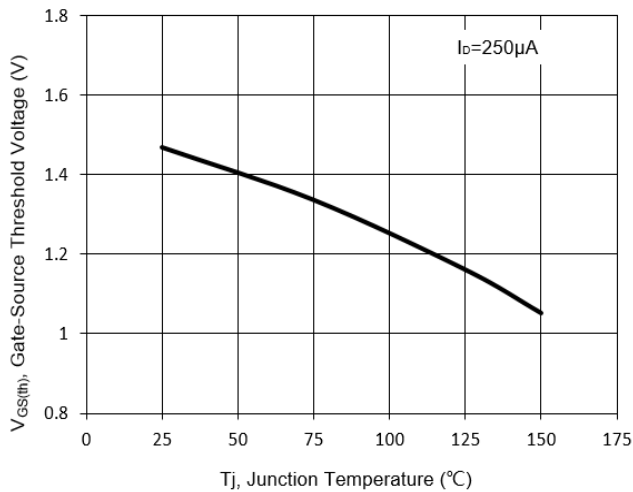


Fig.10 Capacitance Characteristic vs. on Resistance

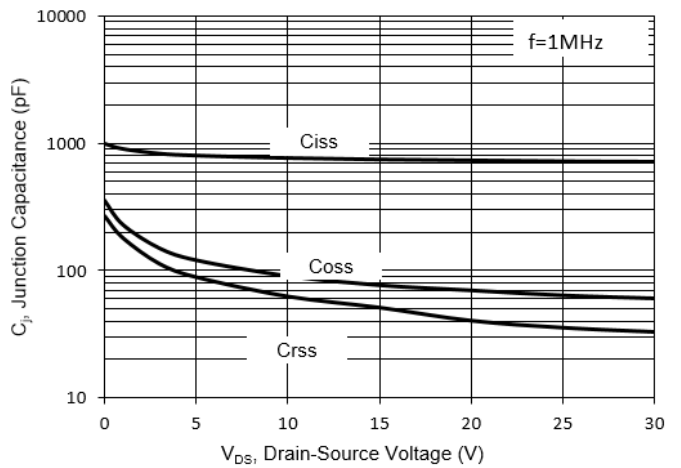


Fig.11 Gate Charge Characteristic

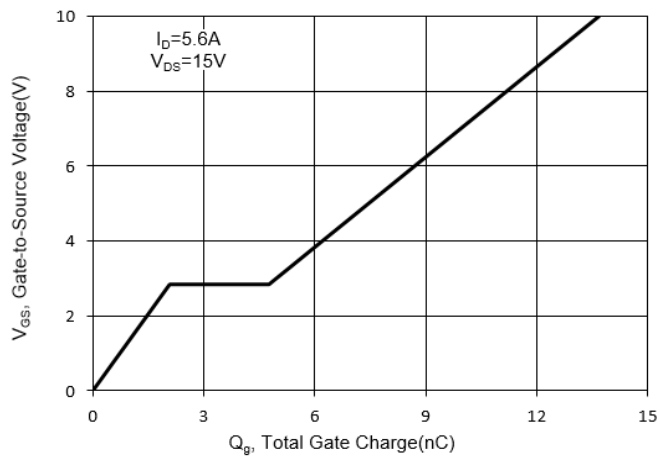
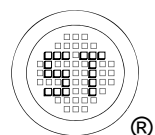
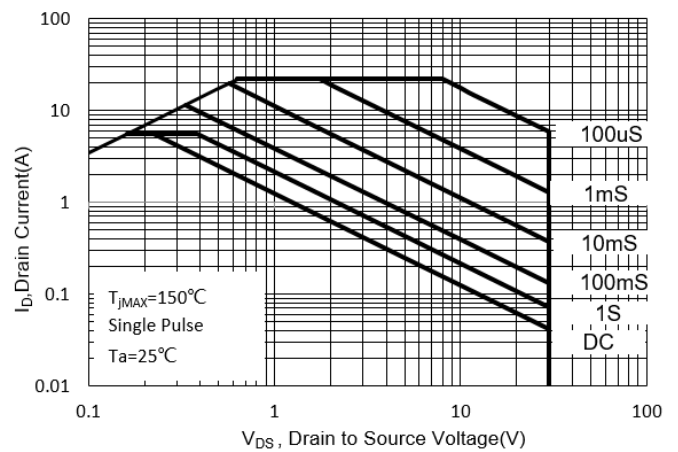
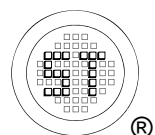
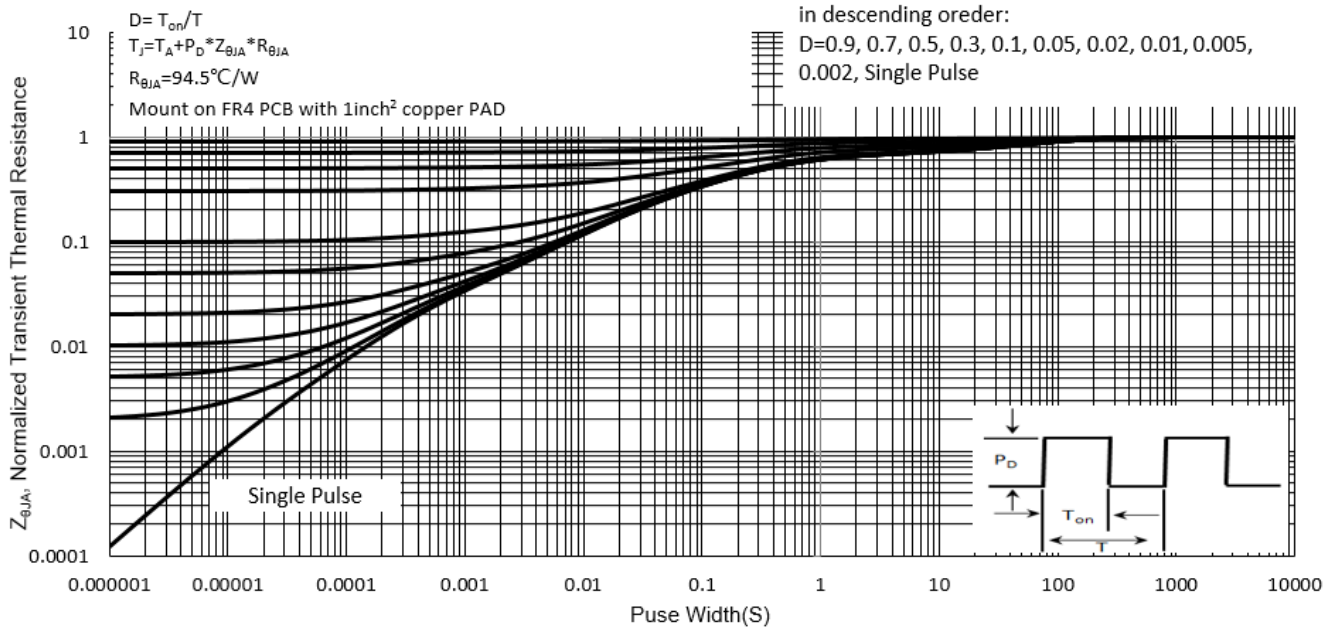


Fig.12 SOA, Safe Operating Area



Electrical Characteristics Curves

Fig.13 Normalized Maximum Transient Thermal Impedance($Z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

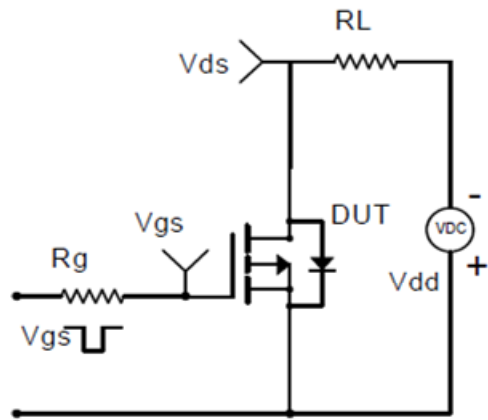


Fig.1-2 Switching Waveform

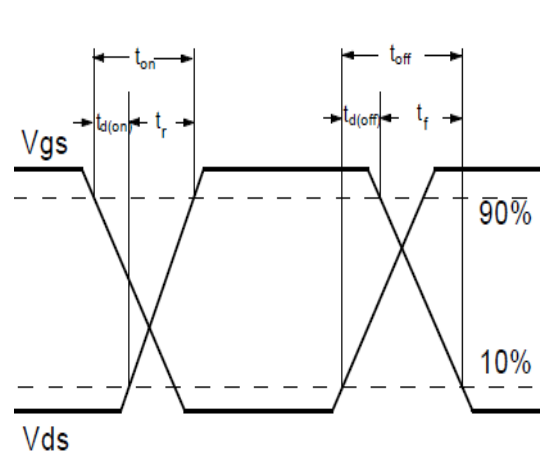


Fig.2-1 Gate charge test circuit

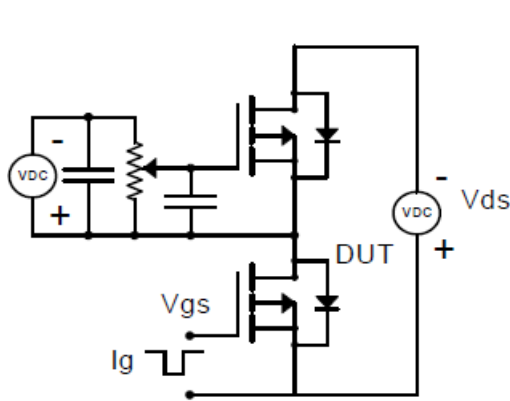
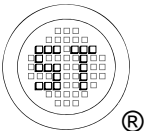
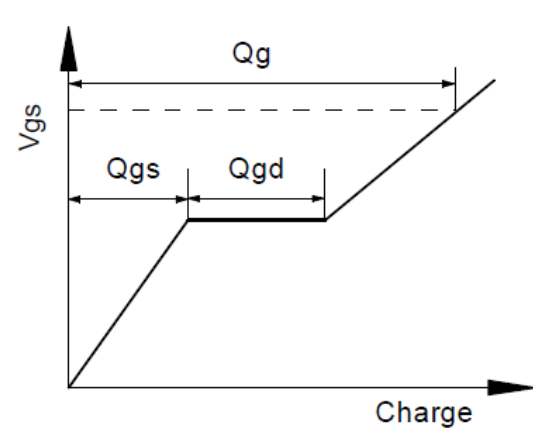
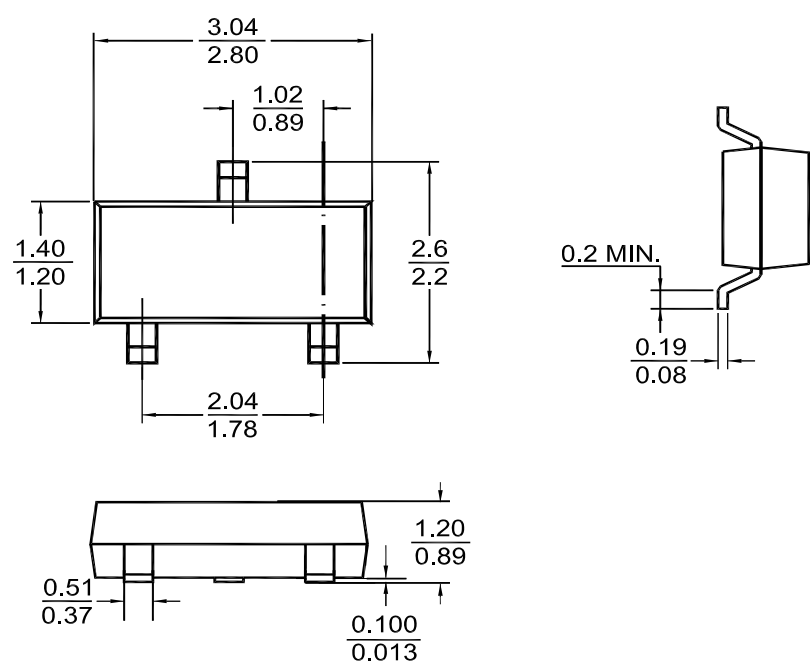


Fig.2-2 Gate charge waveform

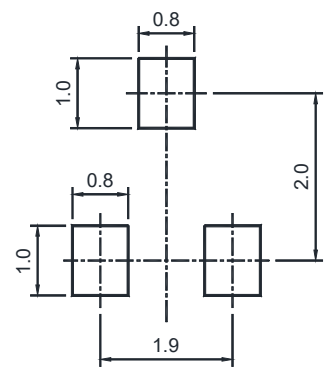


Package Outline (Dimensions in mm)

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

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

