

$V_{DSS}$	400V
$R_{DS(on)}$ (Typ.)	120mΩ
$I_D$	20A
$P_D$	132W

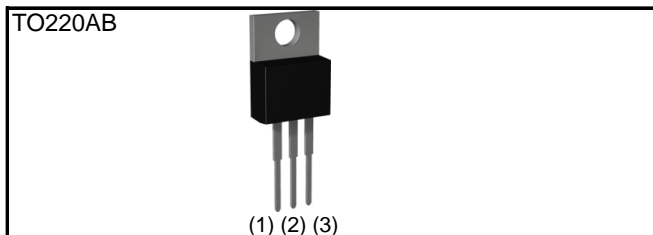
### ●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

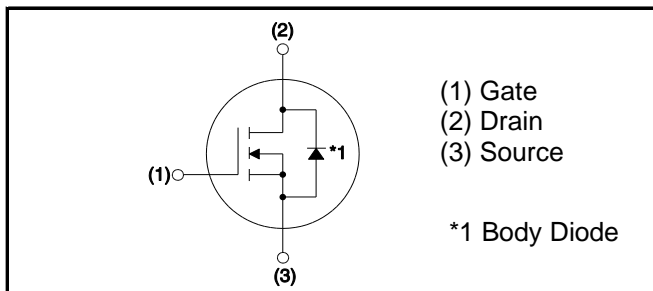
### ●Application

- Audio

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Taping code	-
	Marking	SCTMU001F

### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	400	V
Continuous drain current $T_c = 25^\circ\text{C}$	$I_D^{*1}$	20	A
Pulsed drain current	$I_{D,pulse}^{*2}$	60	A
Gate - Source voltage	$V_{GSS}$	-6 to 22	V
Power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	132	W
Junction temperature	$T_j$	150	$^\circ\text{C}$
Range of storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

## ●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	$R_{thJC}$	-	0.72	0.95	°C/W
Soldering temperature, wavesoldering for 10s	$T_{sold}$	-	-	265	°C

●Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	400	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 400V, V_{GS} = 0V$ $T_j = 25^\circ\text{C}$	-	0.1	1	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$	-	0.5	-	
Gate - Source leakage current	$I_{GSS+}$	$V_{GS} = +22V, V_{DS} = 0V$	-	-	100	nA
Gate - Source leakage current	$I_{GSS-}$	$V_{GS} = -6V, V_{DS} = 0V$	-	-	-100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 3.3mA$	1.6	-	4.0	V
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = 18V, I_D = 10A$ $T_j = 25^\circ\text{C}$	-	120	156	$m\Omega$
		$T_j = 100^\circ\text{C}$	-	137	-	
Gate input resistance	$R_G$	$f = 1MHz, \text{open drain}$	-	14	-	$\Omega$

\*1 Limited only by maximum temperature allowed.

\*2  $PW \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$

\*3 Pulsed

**●Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	$g_{fs}^{*3}$	$V_{DS} = 10\text{V}, I_D = 10\text{A}$	-	2.7	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0\text{V}$	-	1218	-	pF
Output capacitance	$C_{oss}$	$V_{DS} = 200\text{V}$	-	102	-	
Reverse transfer capacitance	$C_{rss}$	$f = 1\text{MHz}$	-	14	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} = 300\text{V}, I_D = 5\text{A}$	-	22	-	ns
Rise time	$t_r^{*3}$	$V_{GS} = 18\text{V}/0\text{V}$	-	23	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L = 60\Omega$	-	67	-	
Fall time	$t_f^{*3}$	$R_G = 0\Omega$	-	30	-	

**●Gate Charge characteristics** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	$Q_g^{*3}$	$V_{DD} = 200\text{V}$	-	59	-	nC
Gate - Source charge	$Q_{gs}^{*3}$	$I_D = 5\text{A}$	-	13	-	
Gate - Drain charge	$Q_{gd}^{*3}$	$V_{GS} = 18\text{V}$	-	18	-	

**●Body diode electrical characteristics** (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	$I_S^{*1}$	$T_c = 25^\circ\text{C}$	-	-	20	A
Inverse diode direct current, pulsed	$I_{SM}^{*2}$		-	-	60	A
Forward voltage	$V_{SD}^{*3}$	$V_{GS} = 0\text{V}, I_S = 10\text{A}$	-	4.3	-	V
Reverse recovery time	$t_{rr}^{*3}$	$I_F = 10\text{A}, V_R = 400\text{V}$ $di/dt = 165\text{A}/\mu\text{s}$	-	29	-	ns
Reverse recovery charge	$Q_{rr}^{*3}$		-	53	-	nC
Peak reverse recovery current	$I_{rrm}^{*3}$		-	3.1	-	A

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

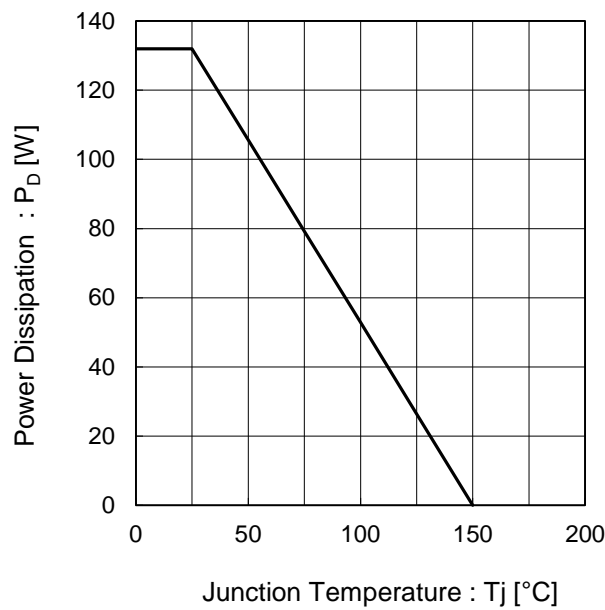


Fig.2 Maximum Safe Operating Area

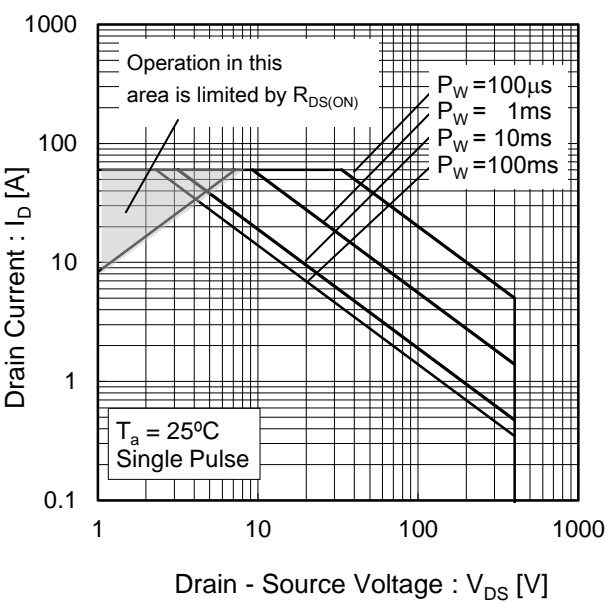
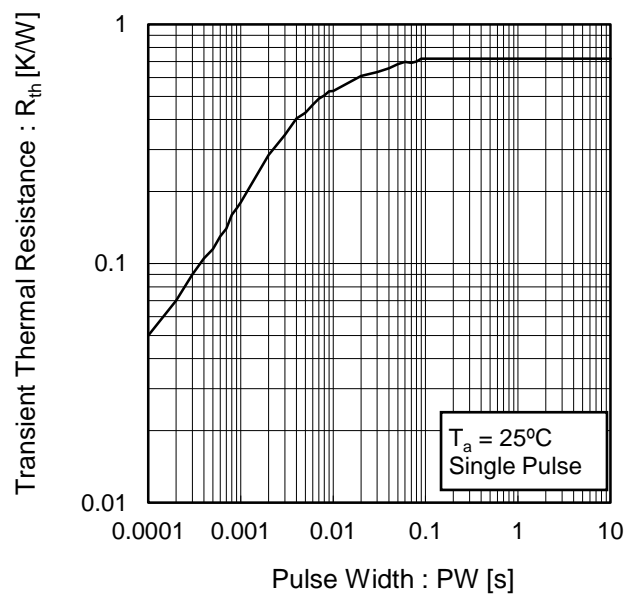


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics

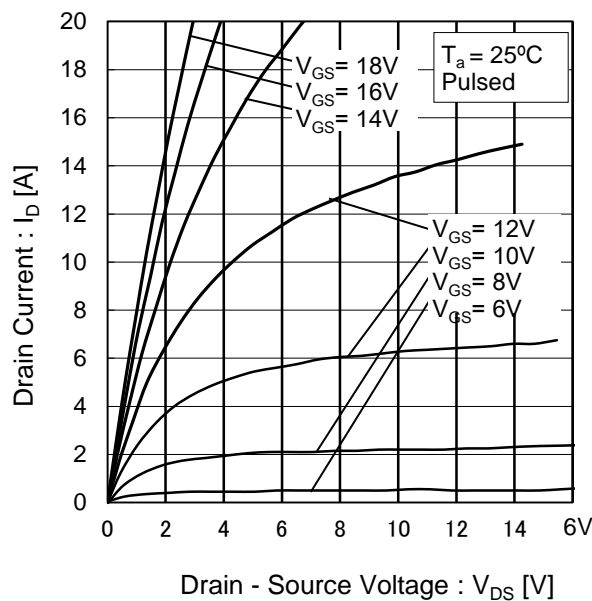


Fig.5  $T_j = 150^\circ\text{C}$  Typical Output Characteristics

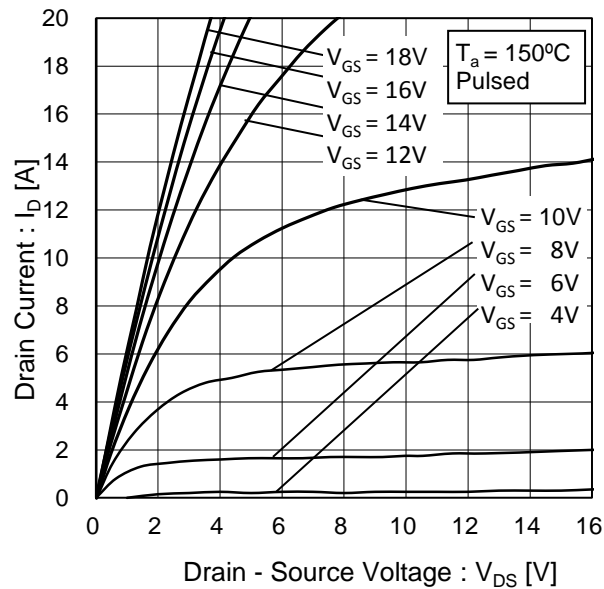


Fig.6 Typical Transfer Characteristics

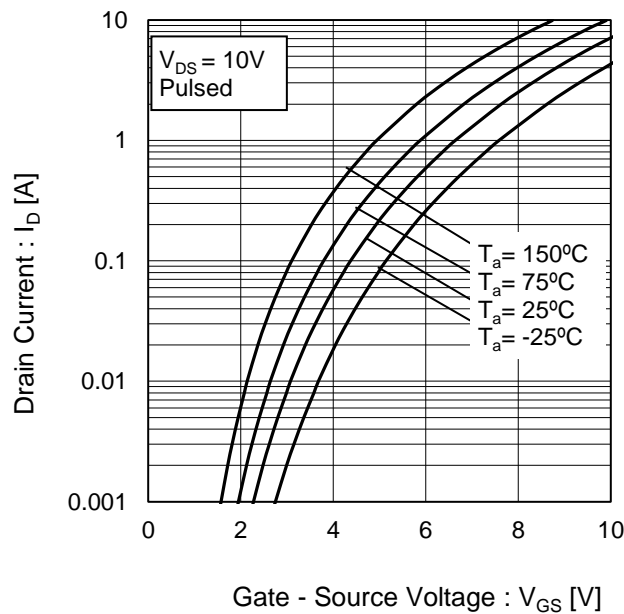
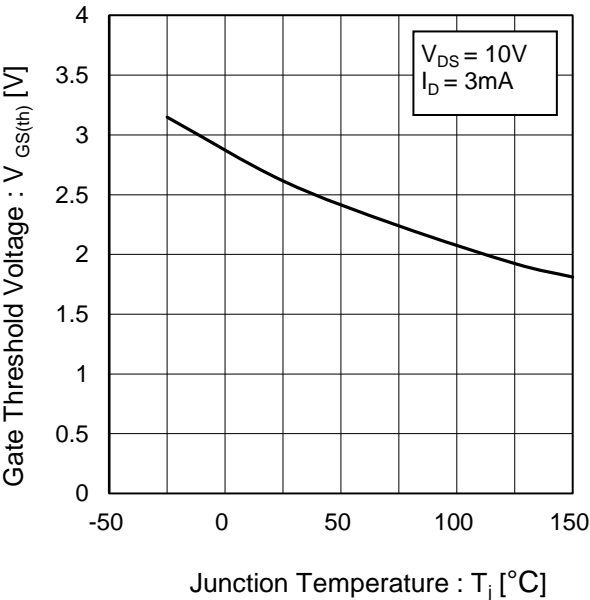


Fig.7 Gate Threshold Voltage vs. Junction Temperature





●Electrical characteristic curves

Fig.12 Typical Capacitance vs. Drain - Source Voltage

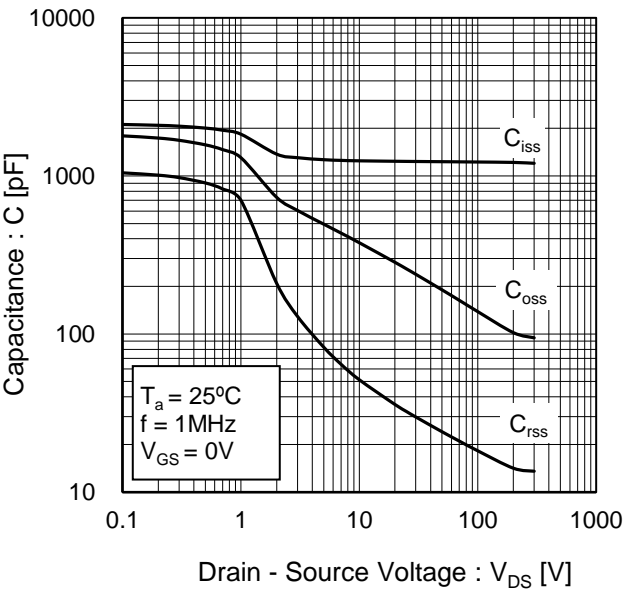


Fig.13 Dynamic Input Characteristics

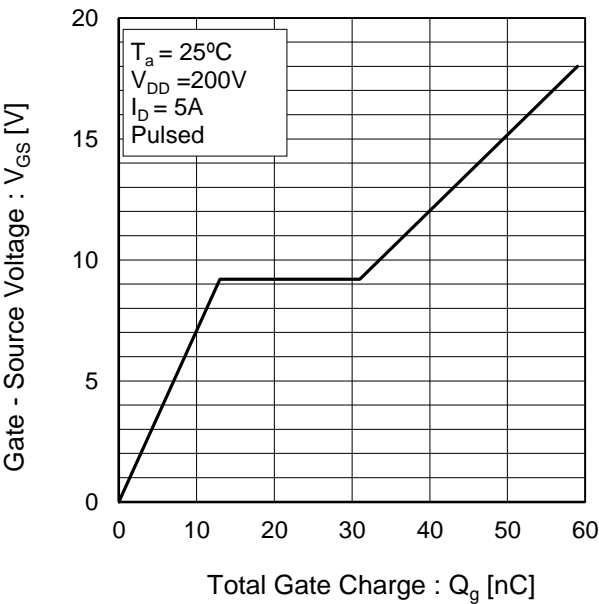
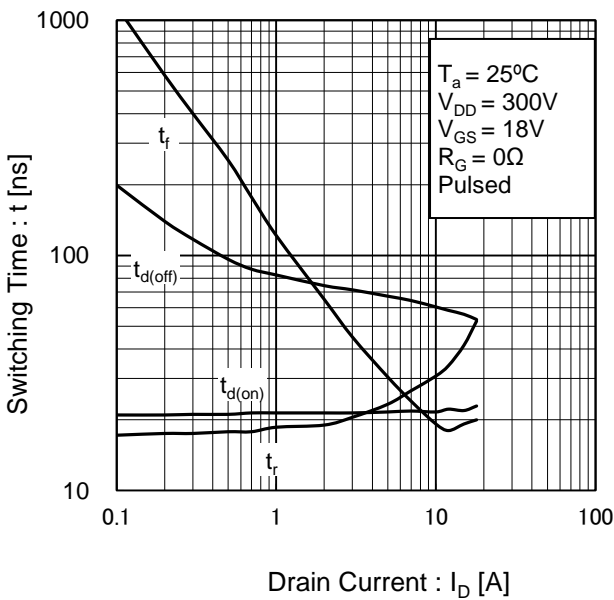


Fig.14 Switching Characteristics



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

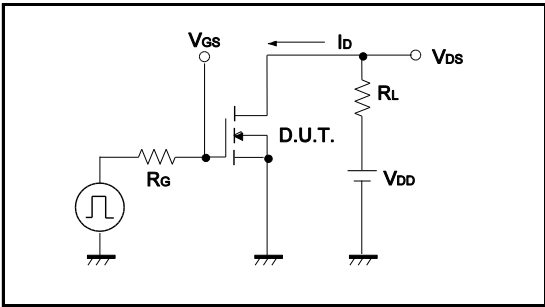


Fig.1-2 Switching Waveforms

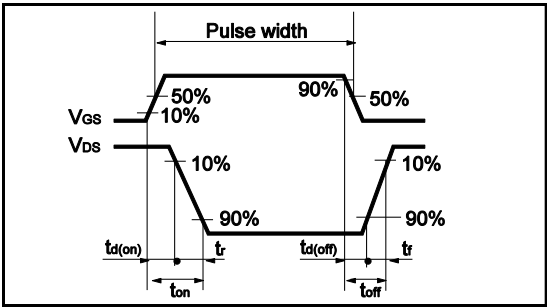


Fig.2-1 Gate Charge Measurement Circuit

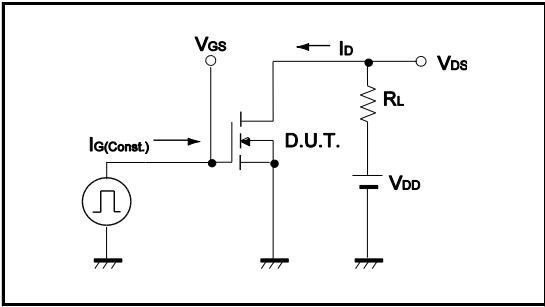
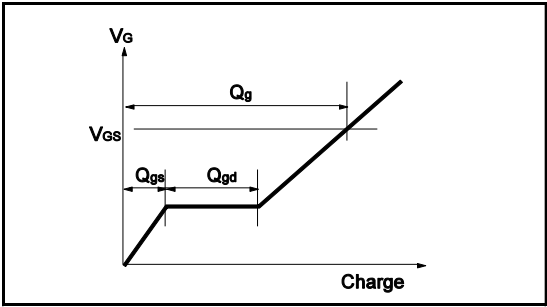


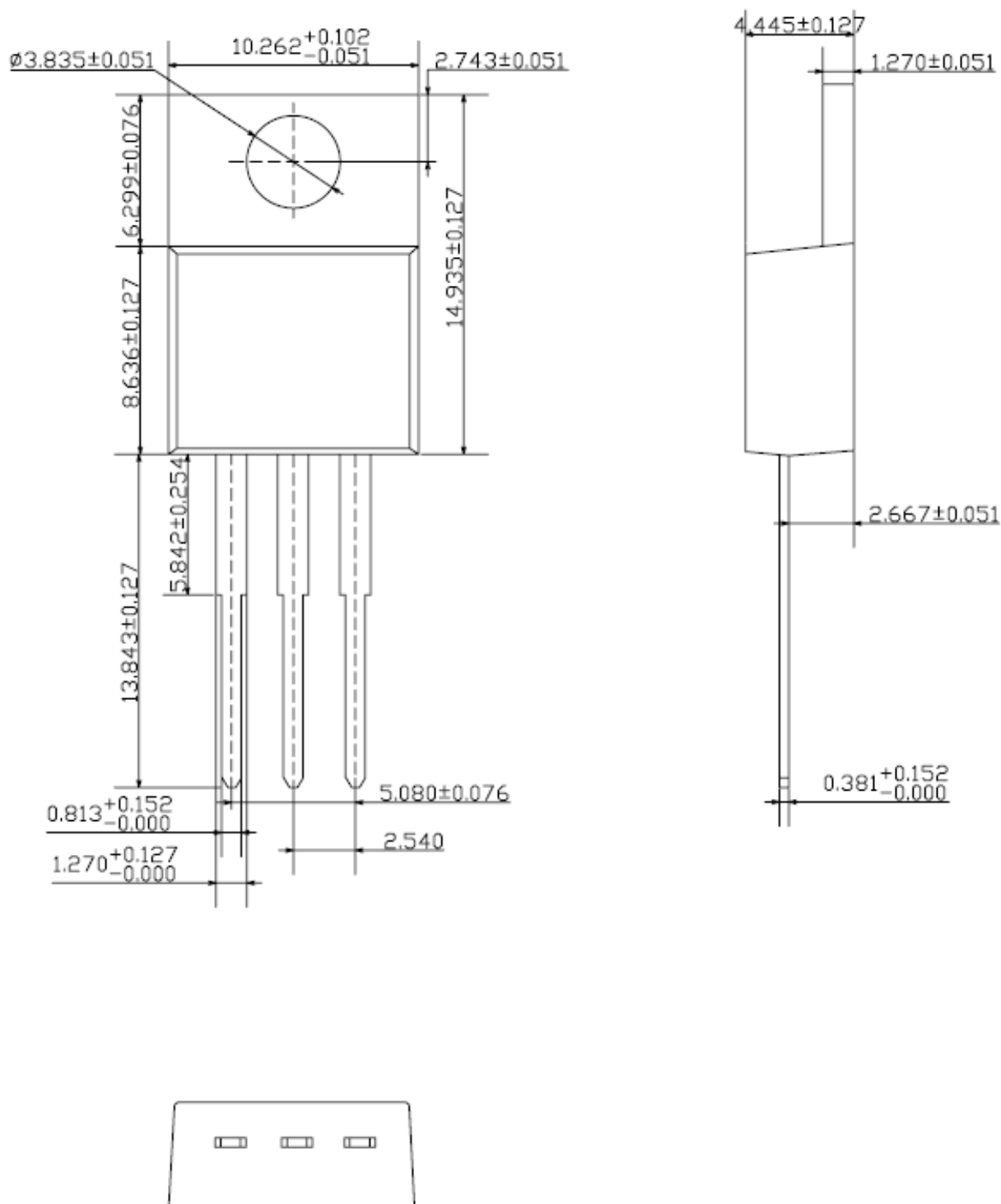
Fig.2-2 Gate Charge Waveform





●Dimensions (Unit : mm)

TO-220AB



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