

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

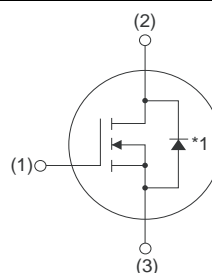
- Audio

●Outline

TO220AB



●Inner circuit



(1) Gate
(2) Drain
(3) Source

*1 Body Diode

●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	μA
		$T_j = 150^\circ\text{C}$	-	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	-	Ω

*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}	$I_D = 5\text{A}$	-1	3-		
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}	$I_F = 10\text{A}, V_R = 400\text{V}$ $di/dt = 165\text{A}/\mu\text{s}$	-2	9-		ns
Reverse recovery charge	Q_{rr}^{*3}		-5	3	-	nC
Peak reverse recovery current	I_{rrm}^{*3}		-	3.1	-	A

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

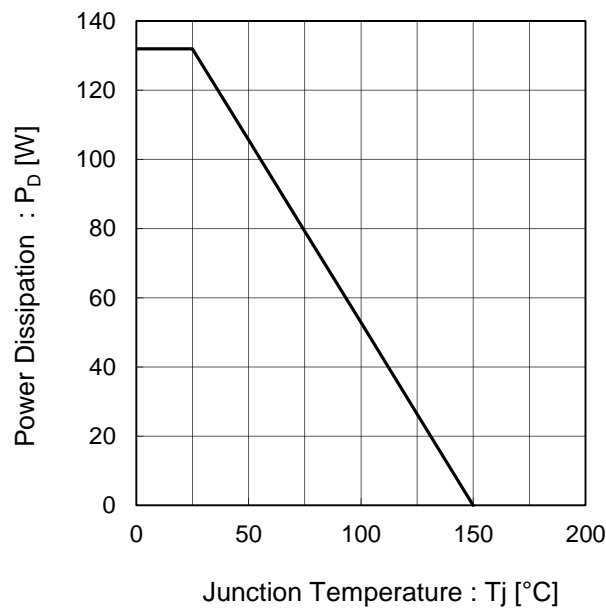


Fig.2 Maximum Safe Operating Area

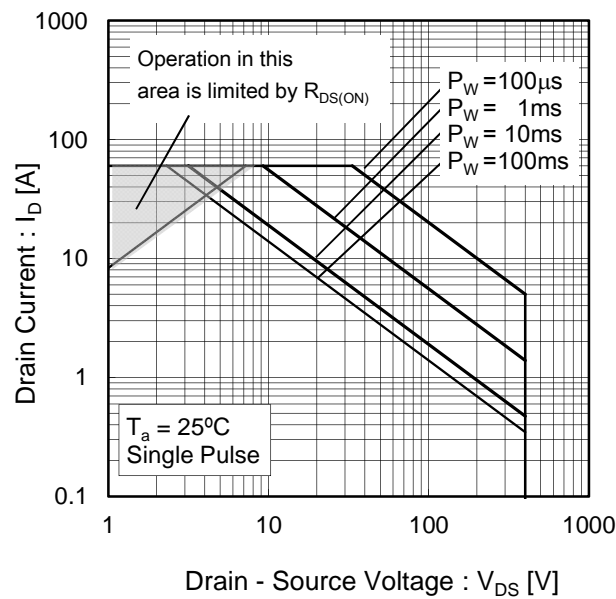
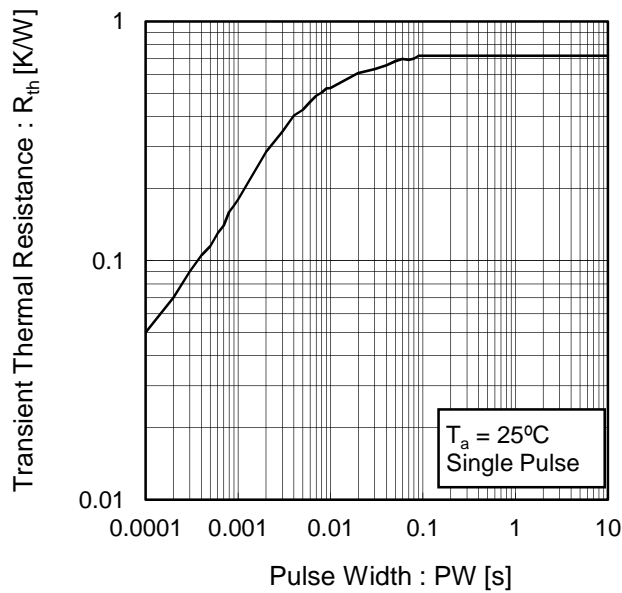


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics

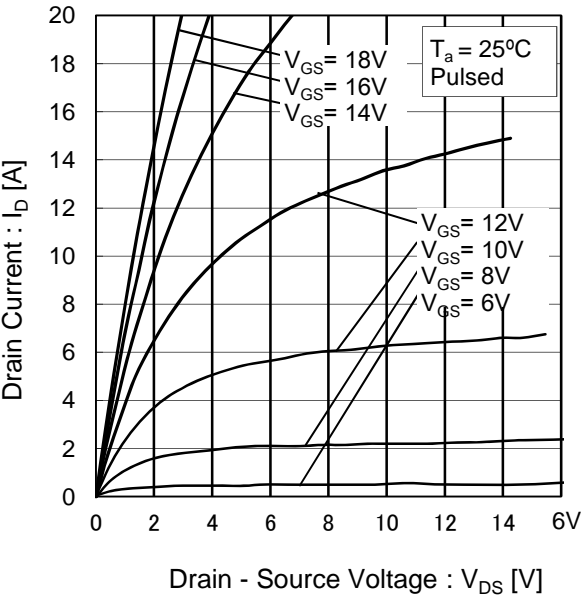


Fig.5 $T_j = 150^\circ\text{C}$ Typical Output Characteristics

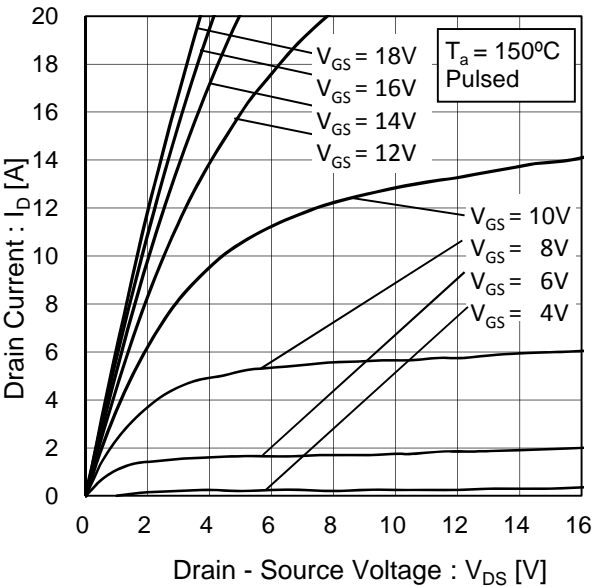


Fig.6 Typical Transfer Characteristics

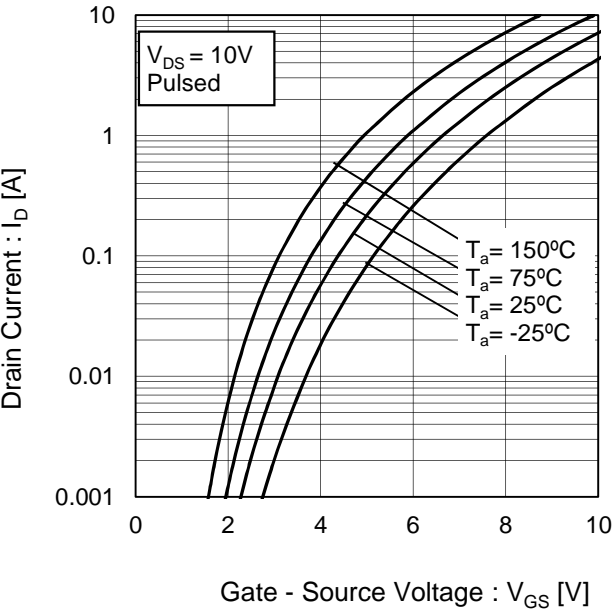
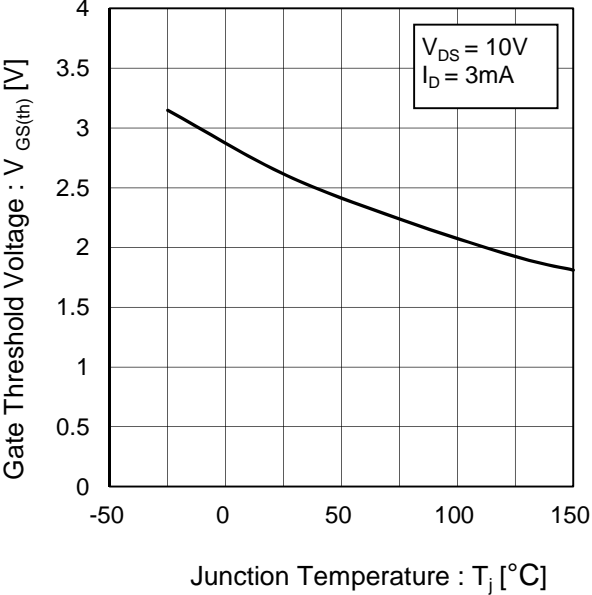


Fig.7 Gate Threshold Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.12 Typical Capacitance vs. Drain - Source Voltage

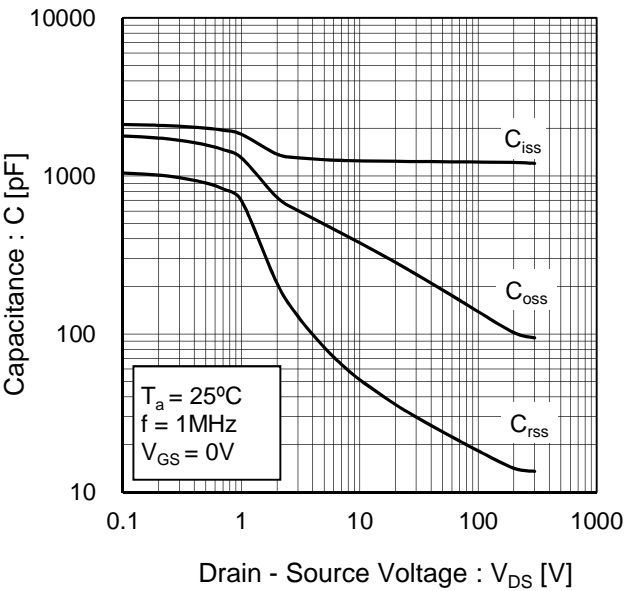


Fig.13 Dynamic Input Characteristics

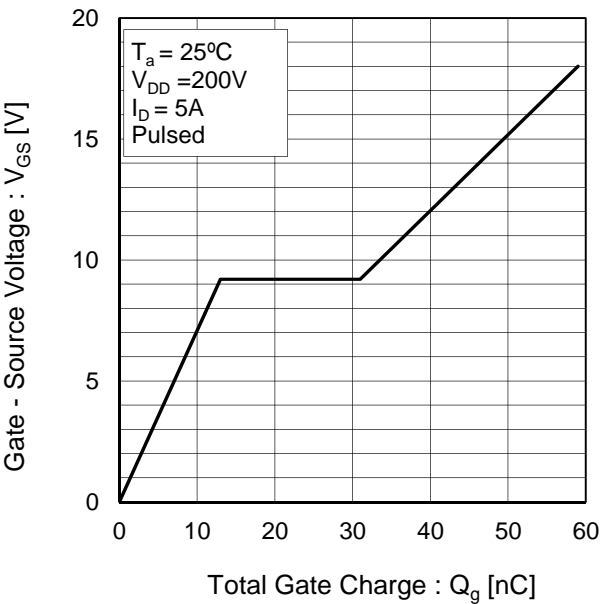
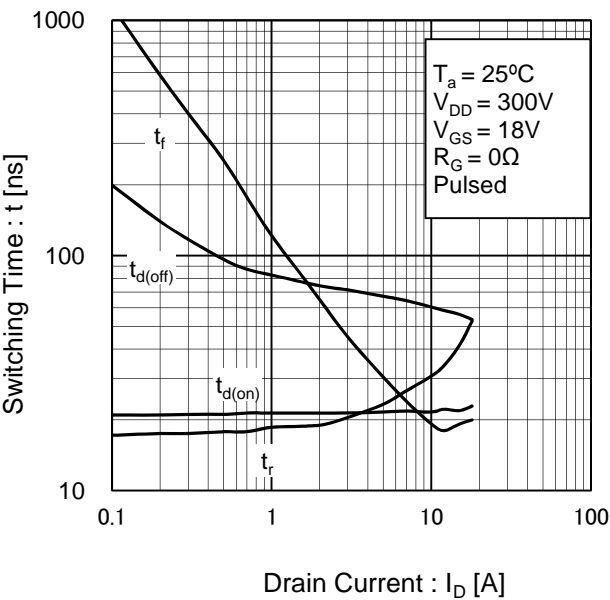


Fig.14 Switching Characteristics



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

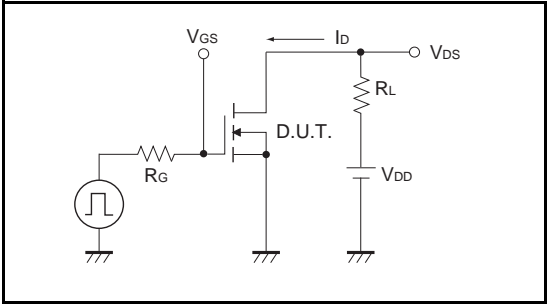


Fig.1-2 Switching Waveforms

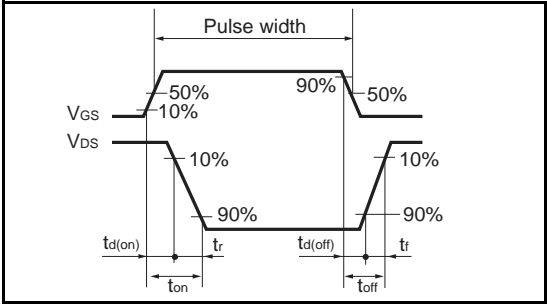


Fig.2-1 Gate Charge Measurement Circuit

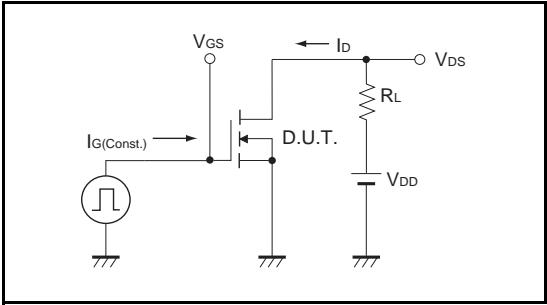
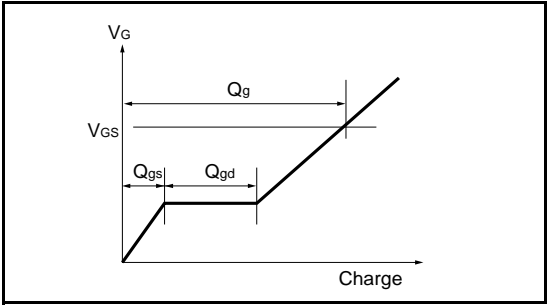
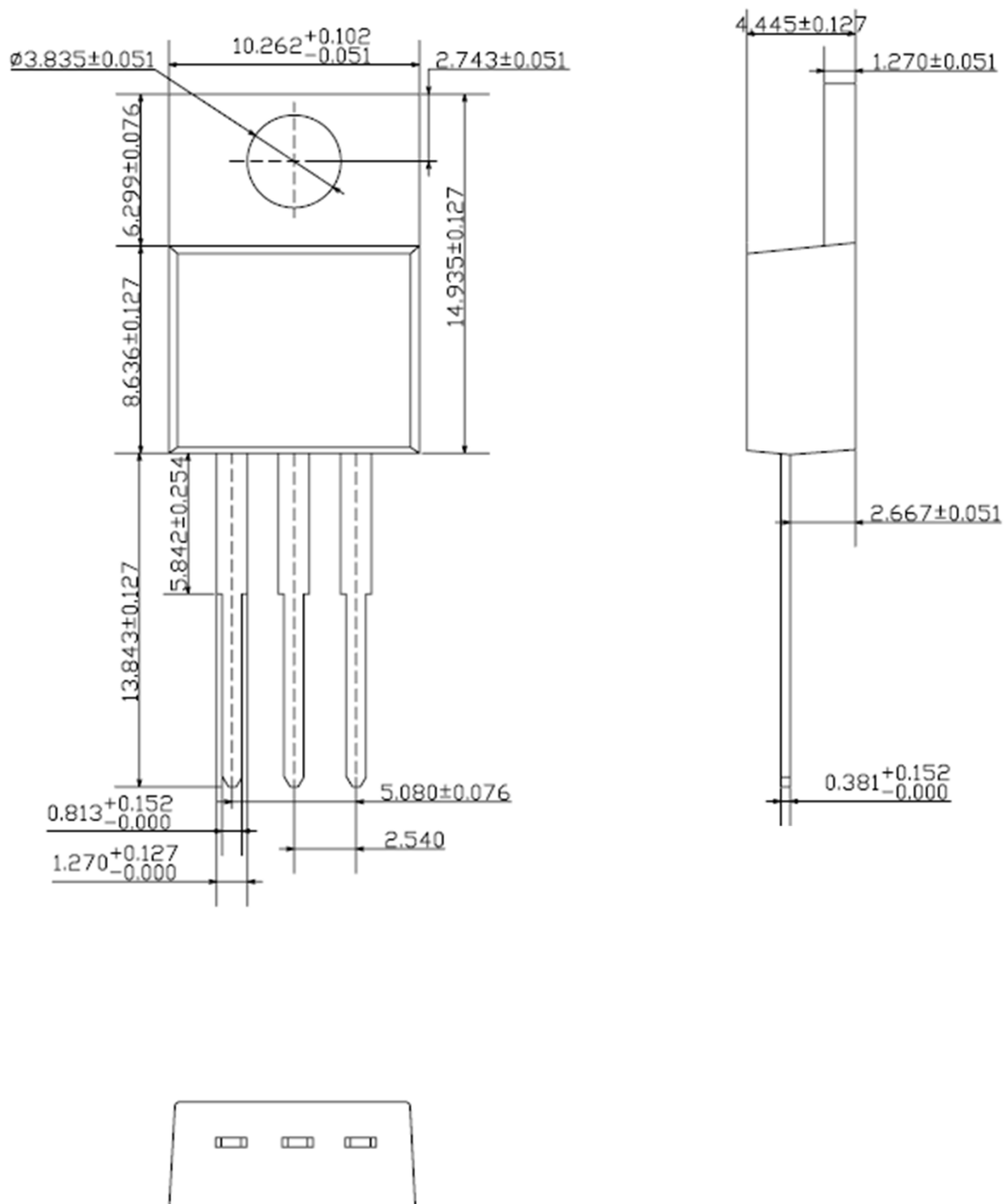


Fig.2-2 Gate Charge Waveform



●Dimensions (Unit : mm)

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