SCTMU001F

N-channel SiC power MOSFET Datasheet

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

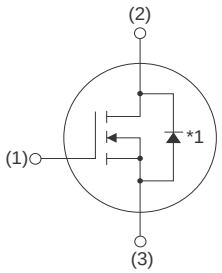
●Outline

TO220AB

●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

●Inner circuit



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

*1 Body Diode

●Application

・Audio

●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°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	400	V
Continuous drain current	T_c = 25°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°C)		P_D	132	W
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	-55 to +150	°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°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°C T_j = 150°C	- -	0.1 0.5	1 -	μA
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°C T_j = 100°C	- -	120 137	156 -	mΩ
Gate input resistance	R_G	f = 1MHz, open drain	-	14	-	Ω

*1 Limited only by maximum temperature allowed.

*2 PW ≤ 10μs, Duty cycle ≤ 1%

*3 Pulsed

●Electrical characteristics (T_a = 25°C)

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

●Gate Charge characteristics (T_a = 25°C)

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

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	20	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	60	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 10A	-	4.3	-	V
Reverse recovery time	t_{rr} *3	I_F = 10A, V_R = 400V di/dt = 165A/μs	-	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

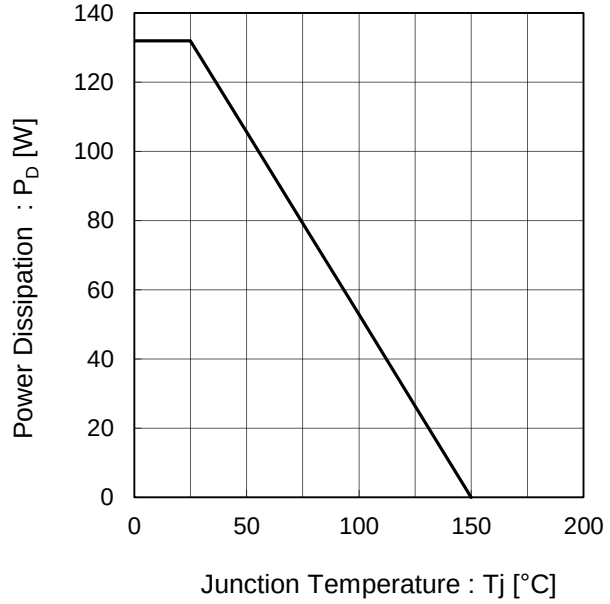


Fig.2 Maximum Safe Operating Area

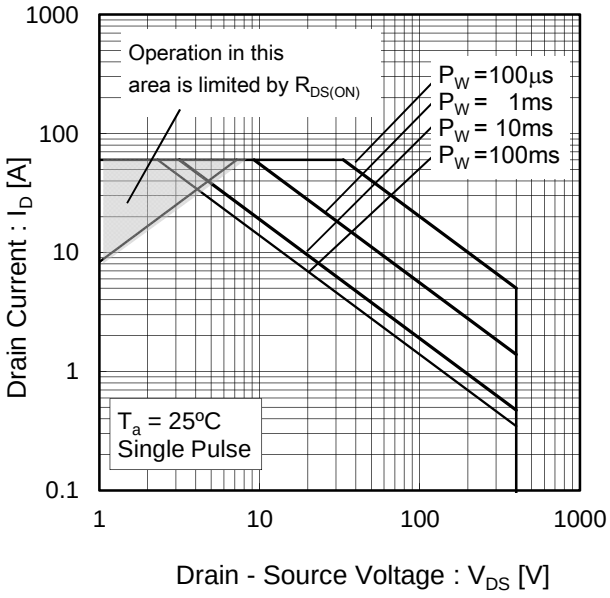
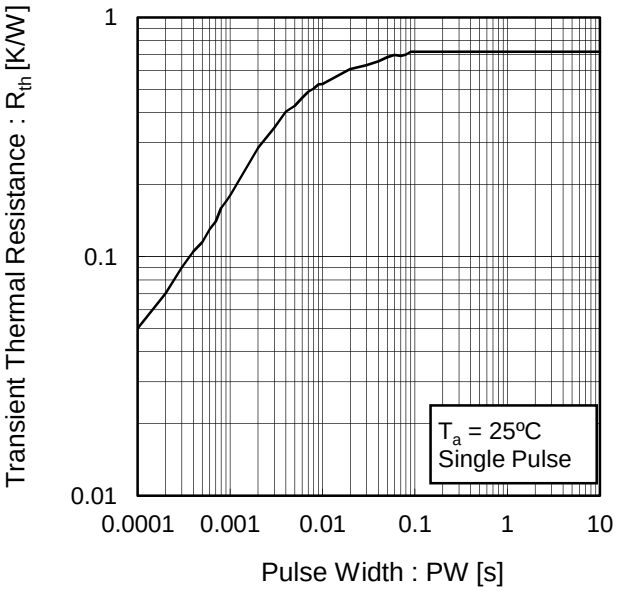


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics

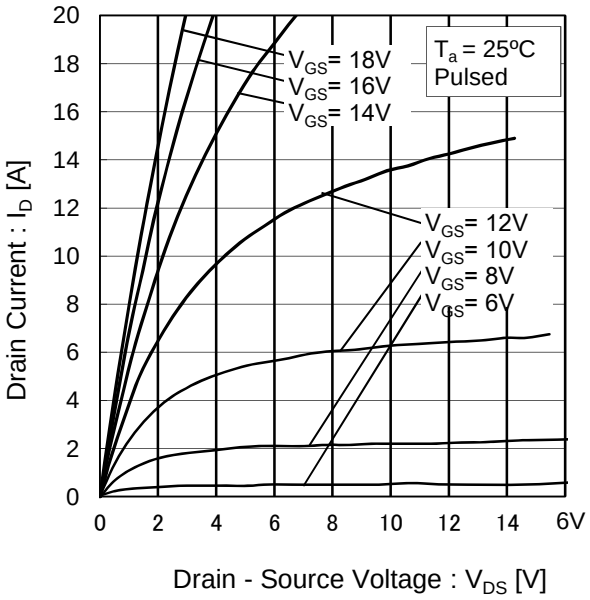


Fig.5 Tj = 150° C Typical Output Characteristics

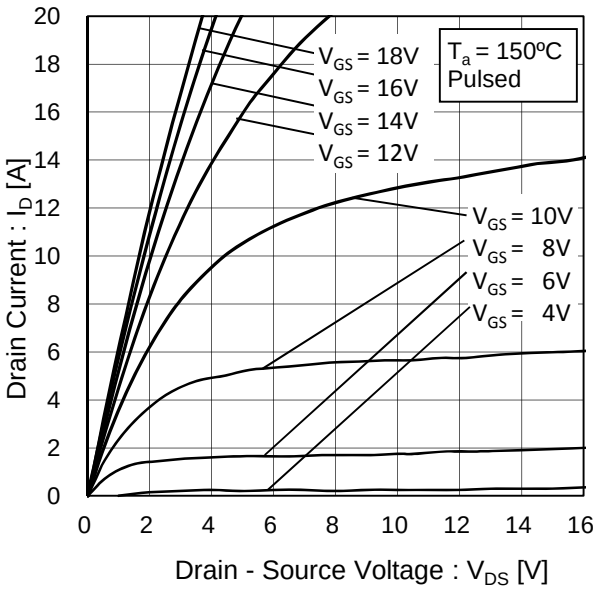


Fig.6 Typical Transfer Characteristics

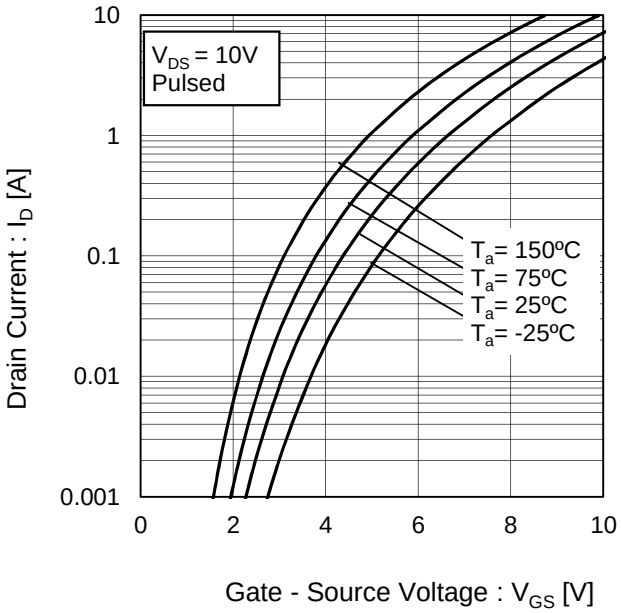
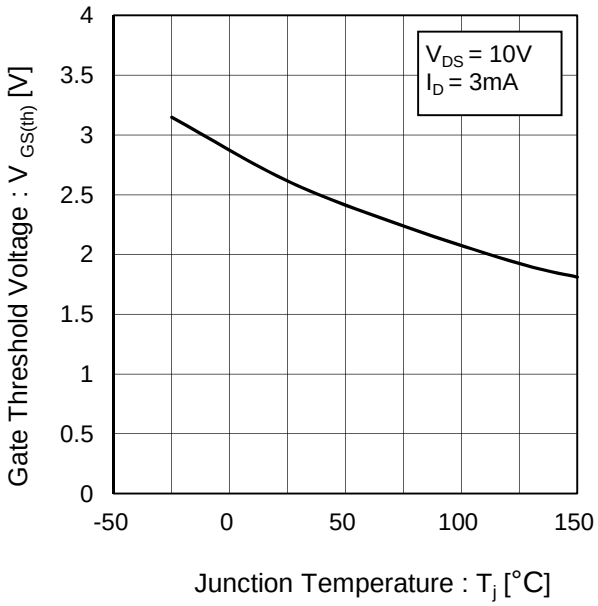


Fig.7 Gate Threshold Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.8 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

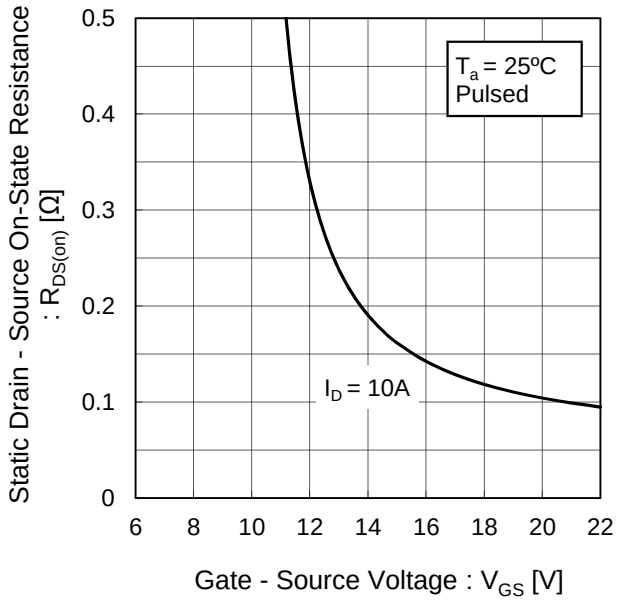


Fig.9 Static Drain - Source On - State Resistance vs. Junction Temperature

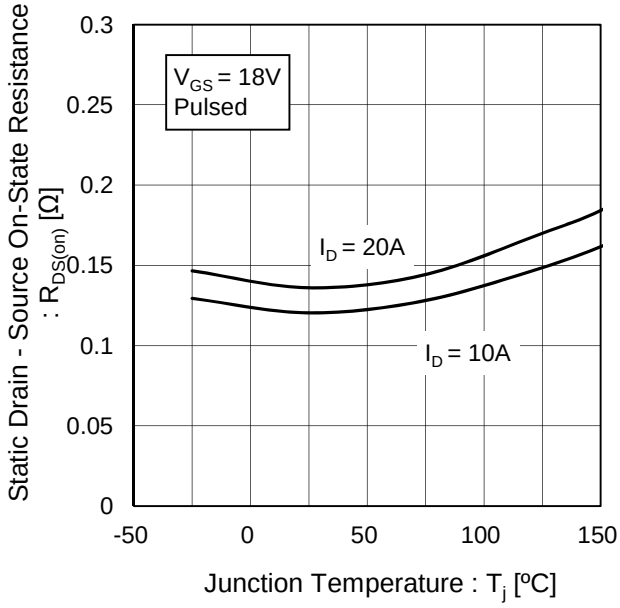


Fig.10 Static Drain - Source On - State Resistance vs. Drain Current

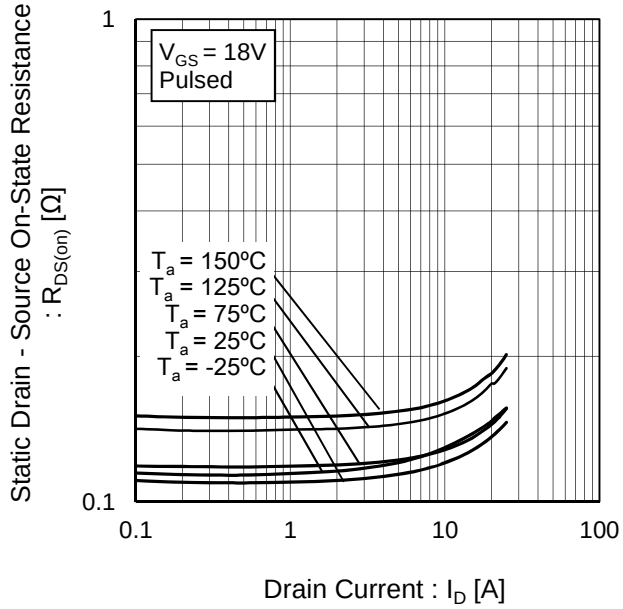
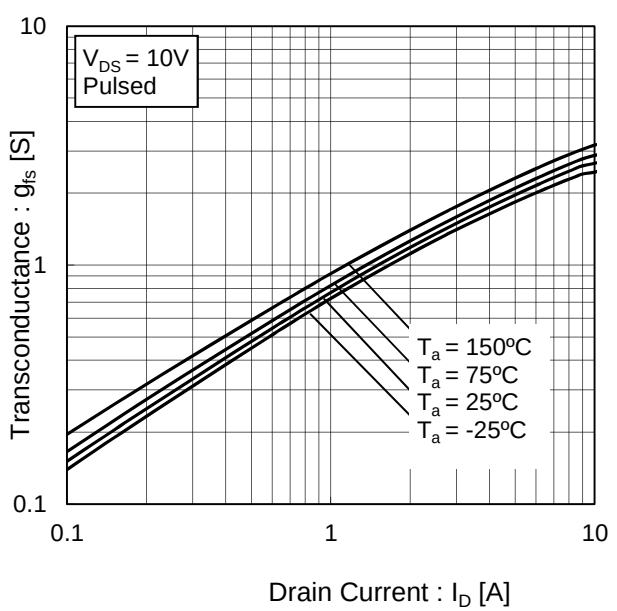


Fig.11 Transconductance vs. Drain Curren



●Electrical characteristic curves

Fig.12 Typical Capacitance vs. Drain - Source Voltage

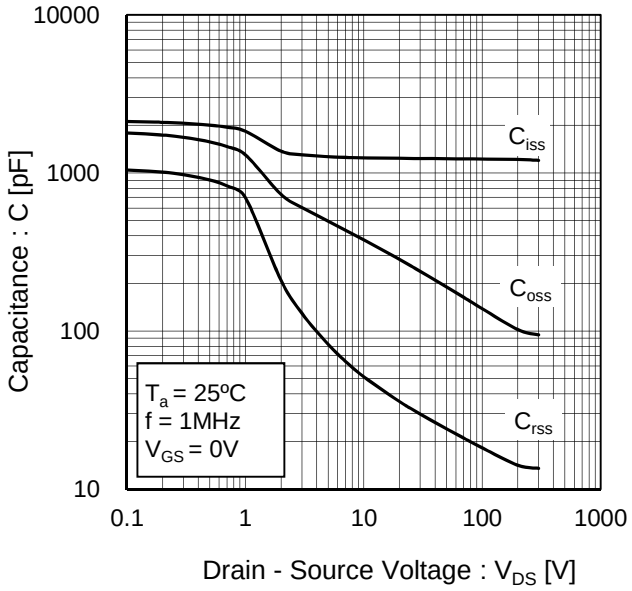


Fig.13 Dynamic Input Characteristics

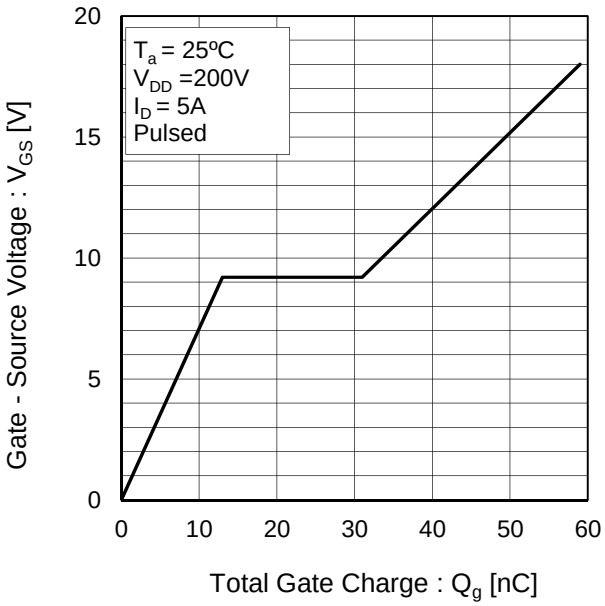
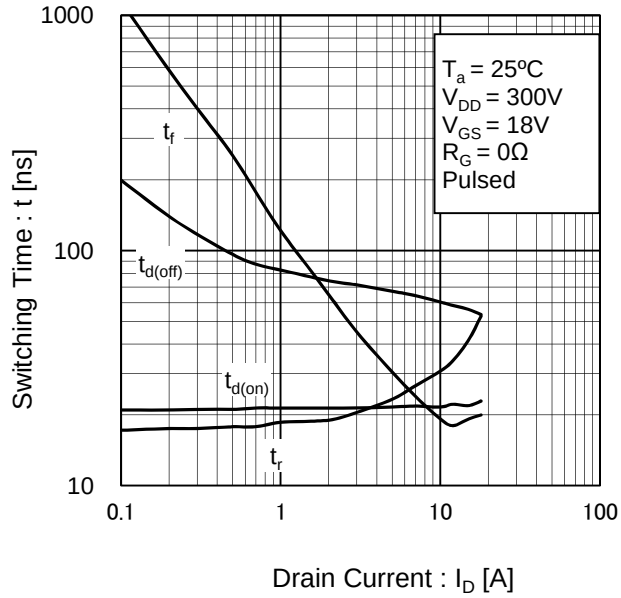


Fig.14 Switching Characteristics



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

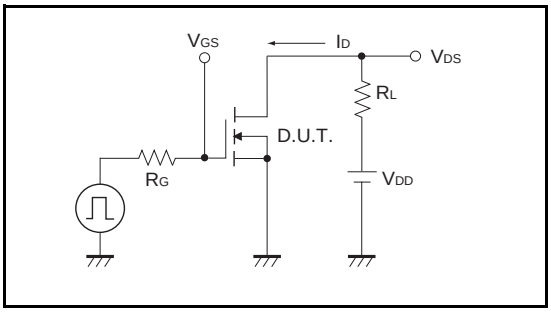


Fig.1-2 Switching Waveforms

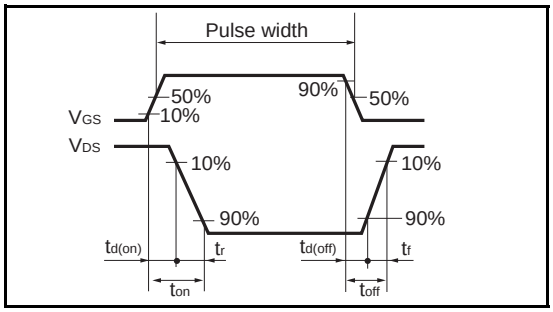


Fig.2-1 Gate Charge Measurement Circuit

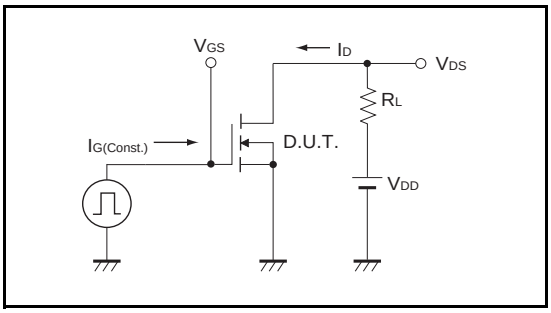
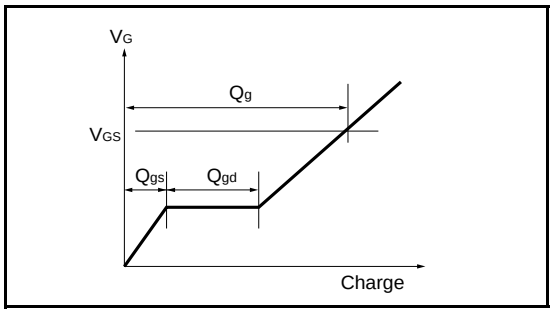
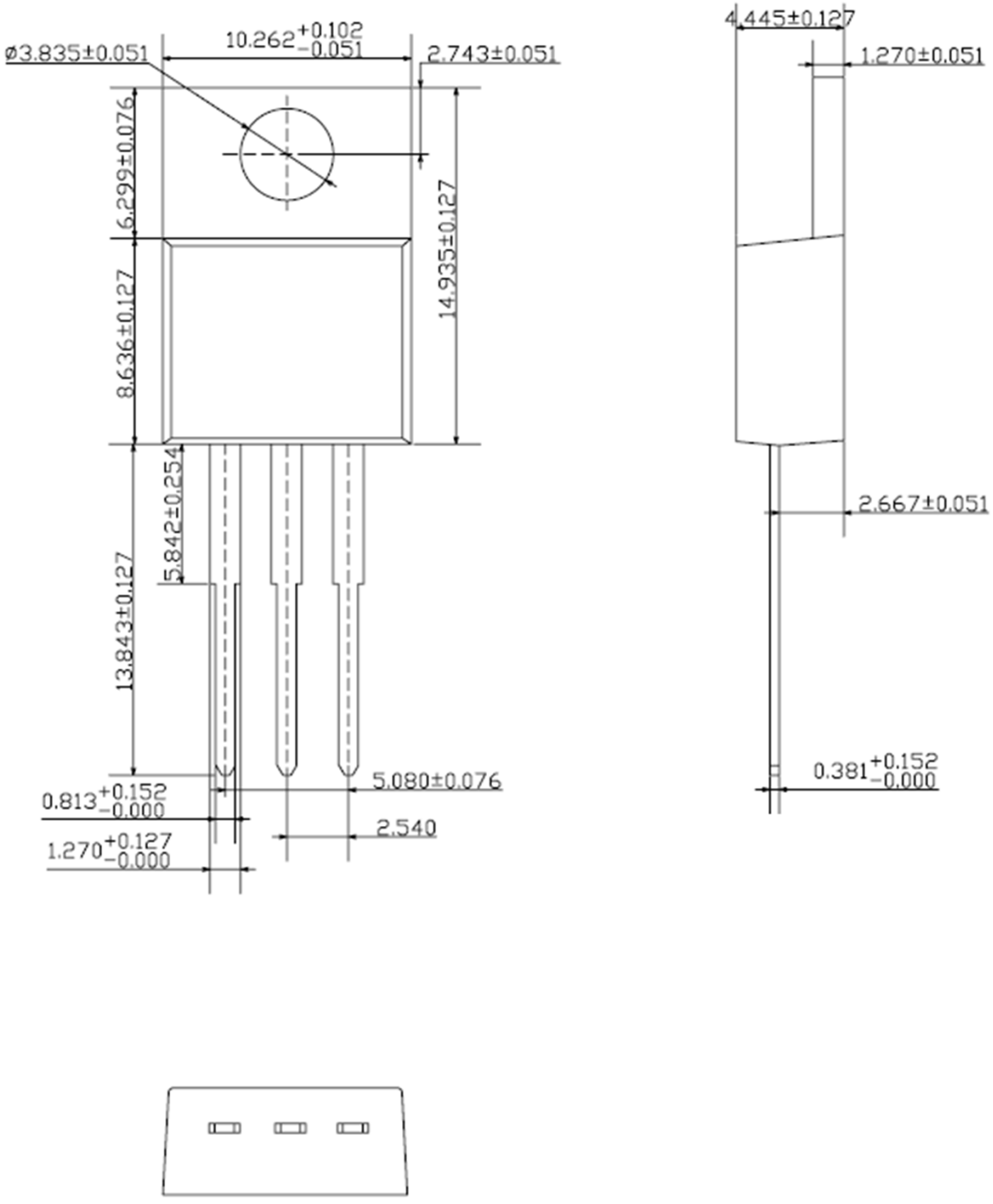


Fig.2-2 Gate Charge Waveform



●**Dimensions** (Unit : mm)

TO-220AB



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