

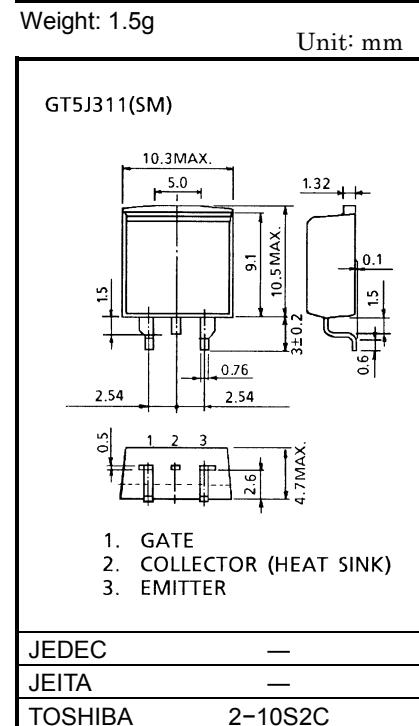
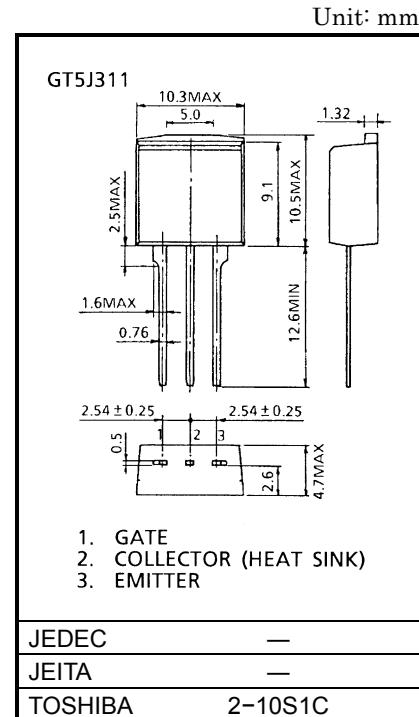
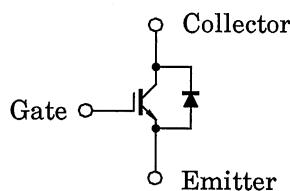
TENTATIVE

TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR  
SILICON N CHANNEL IGBT**GT5J311,GT5J311(SM)**HIGH POWER SWITCHING APPLICATIONS  
MOTOR CONTROL APPLICATIONS

- The 3rd Generation
- Enhancement-Mode
- High Speed :  $t_f = 0.30\mu s$  (Max.) ( $I_C = 5A$ )
- Low Saturation Voltage :  $V_{CE}(\text{sat}) = 2.7V$  (Max.) ( $I_C = 5A$ )
- FRD included between Emitter and Collector.

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	$V_{CES}$	600	V
Gate-Emitter Voltage	$V_{GES}$	$\pm 20$	V
Collector Current	DC	$I_C$	A
	1ms	$I_{CP}$	A
Emitter-Collector Forward Current	DC	$I_F$	A
	1ms	$I_{FM}$	A
Collector Power Dissipation ( $T_c = 25^\circ C$ )	$P_C$	45	W
Junction Temperature	$T_j$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C

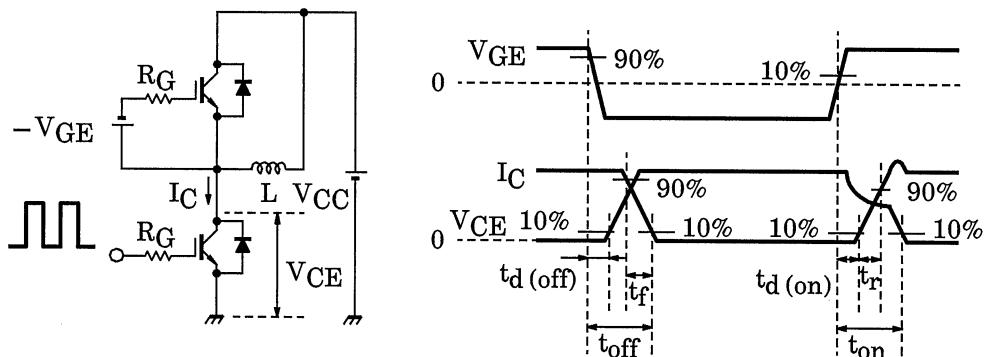
**EQUIVALENT CIRCUIT**

Weight: 1.4g

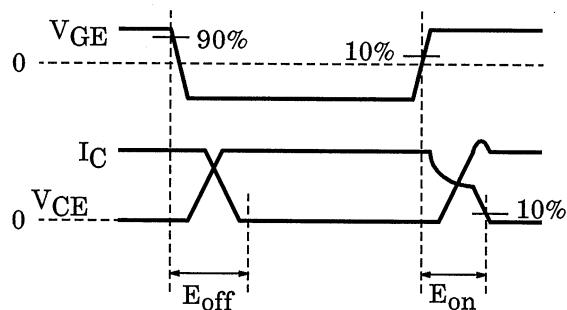
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

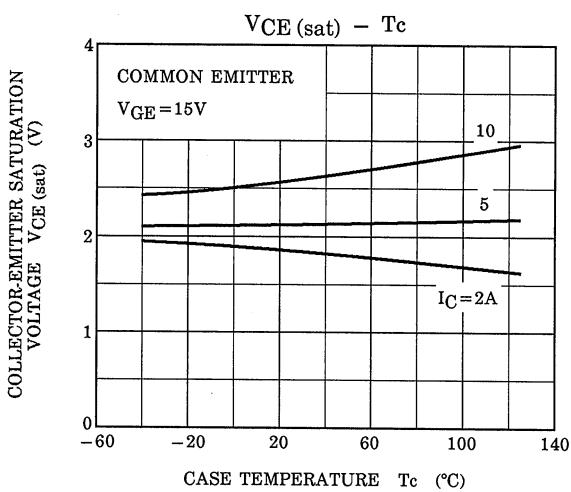
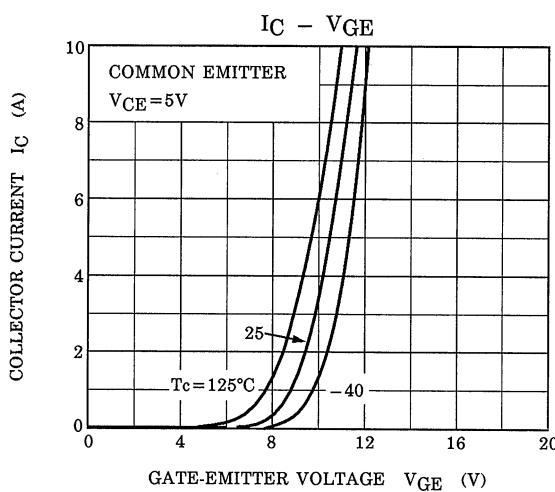
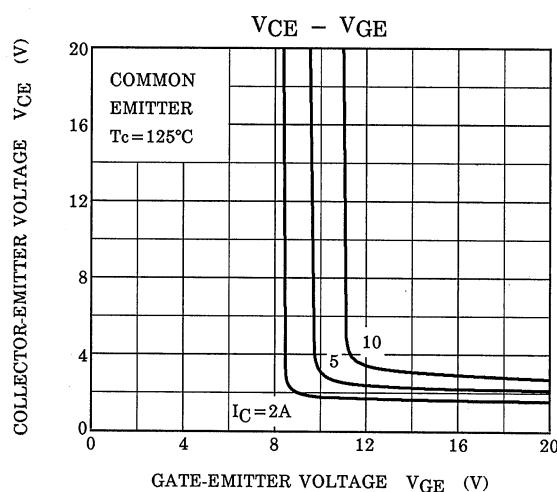
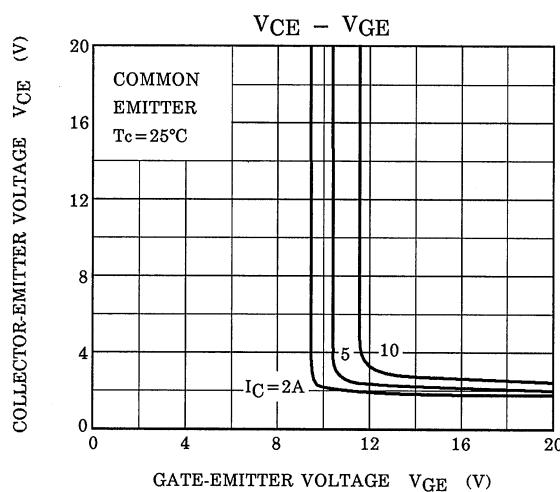
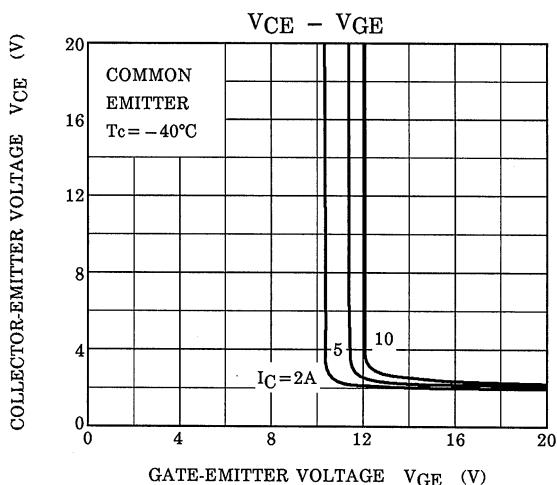
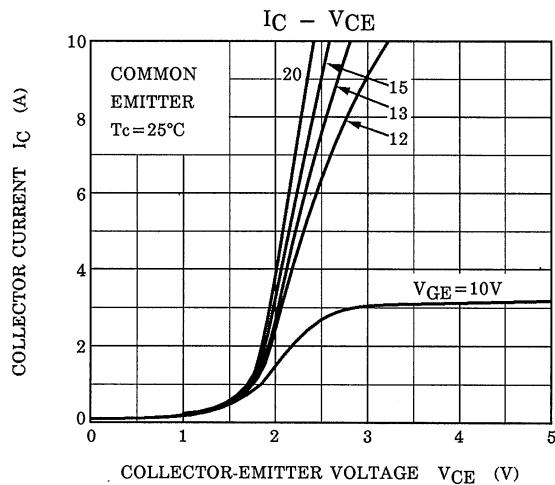
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Gate Leakage Current	I <sub>GES</sub>	V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0	—	—	±500	nA
Collector Cut-Off Current	I <sub>CES</sub>	V <sub>CE</sub> = 600V, V <sub>GE</sub> = 0	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage	V <sub>GE</sub> (OFF)	I <sub>C</sub> = 0.5mA, V <sub>CE</sub> = 5V	5.0	—	8.0	V
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 5A, V <sub>GE</sub> = 15V	—	2.1	2.7	V
Input Capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 20V, V <sub>GE</sub> = 0, f = 1MHz	—	650	—	pF
Switching Time	Rise Time	t <sub>r</sub>	Inductive Load V <sub>CC</sub> = 300V, I <sub>C</sub> = 5A V <sub>GG</sub> = ±15V, R <sub>G</sub> = 180Ω (Note 1)	0.12	—	μs
	Turn-On Time	t <sub>on</sub>		0.40	—	
	Fall Time	t <sub>f</sub>		0.15	0.30	
	Turn-Off Time	t <sub>off</sub>		0.50	—	
Peak Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 5A, V <sub>GE</sub> = 0	—	—	1.8	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 5A, di / dt = -100A / μs	—	—	200	ns
Thermal Resistance (IGBT)	R <sub>th</sub> (j-c)	—	—	—	2.8	°C / W
Thermal Resistance (Diode)	R <sub>th</sub> (j-c)	—	—	—	3.76	°C / W

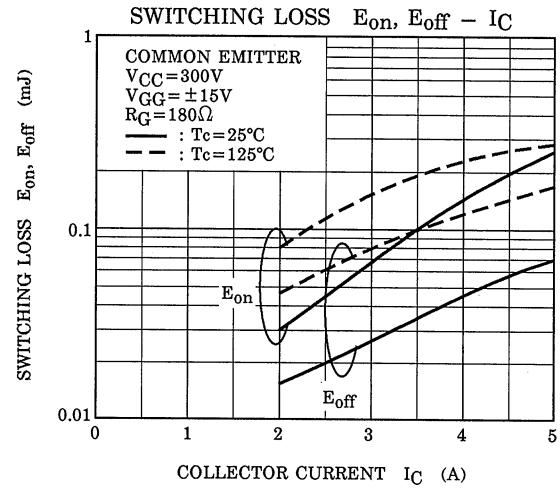
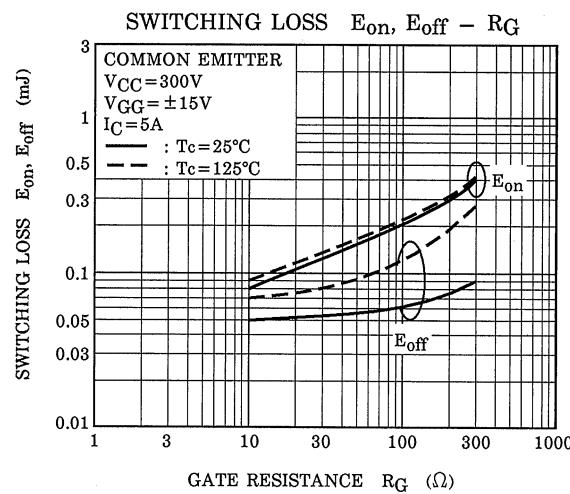
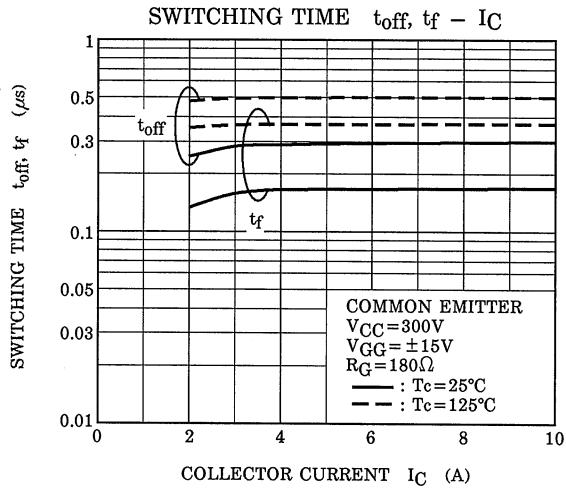
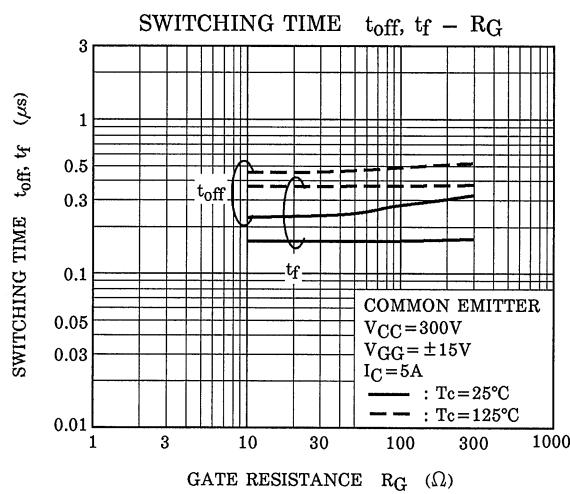
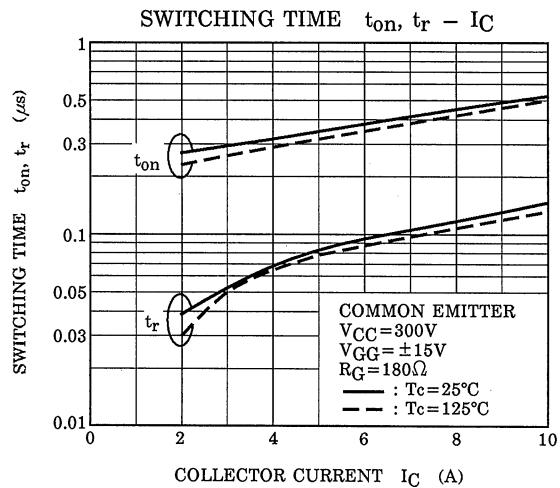
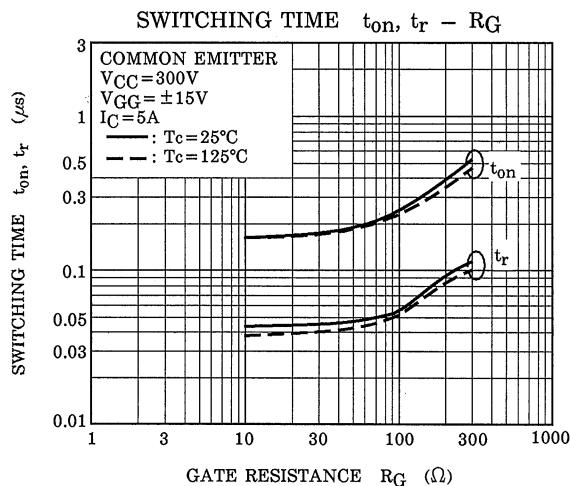
Note 1: Switching time measurement circuit and input / output waveforms

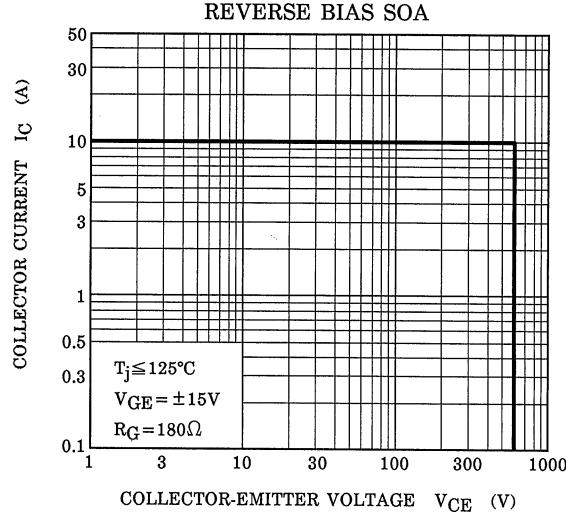
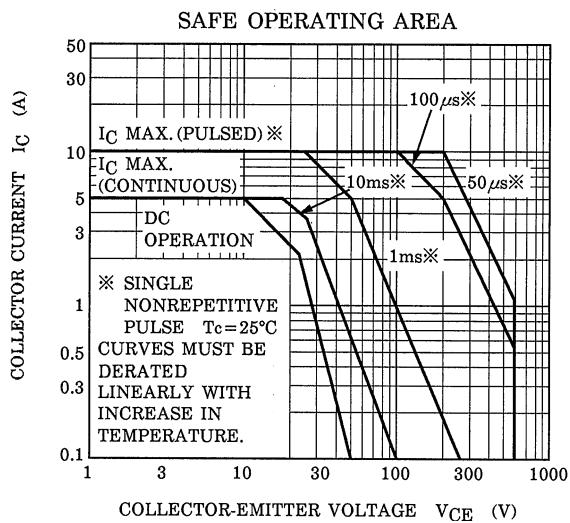
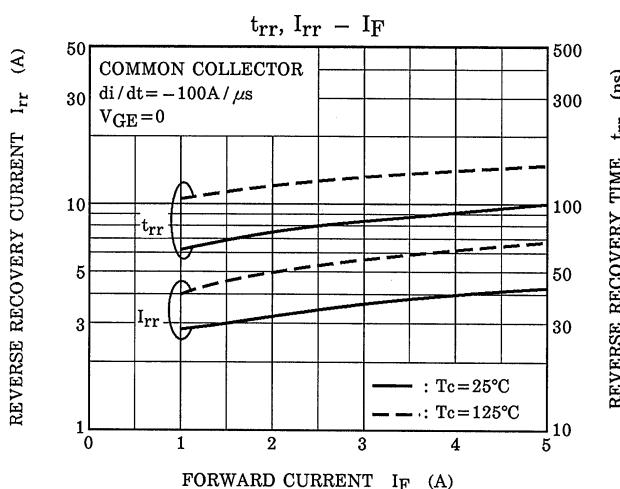
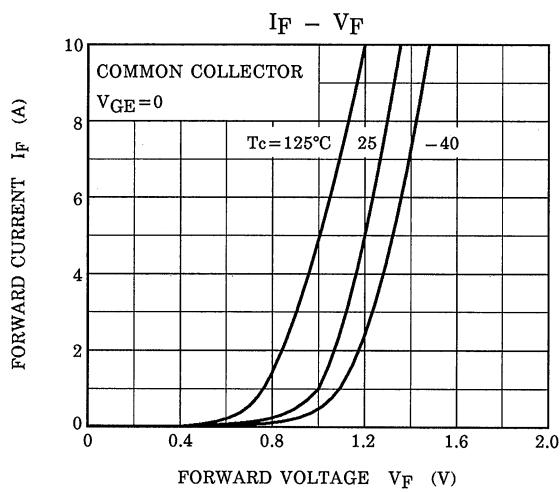
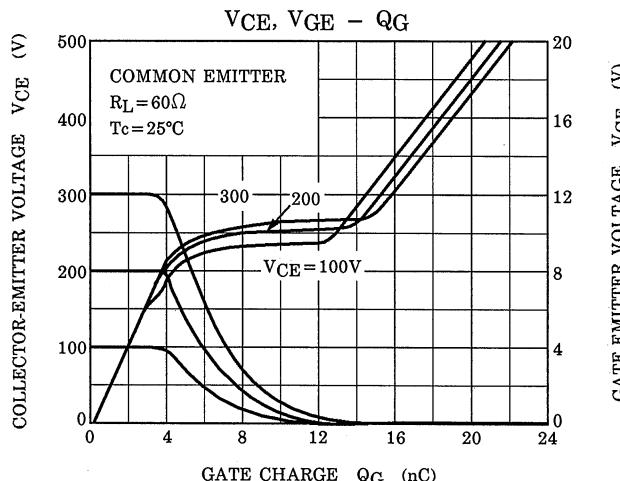
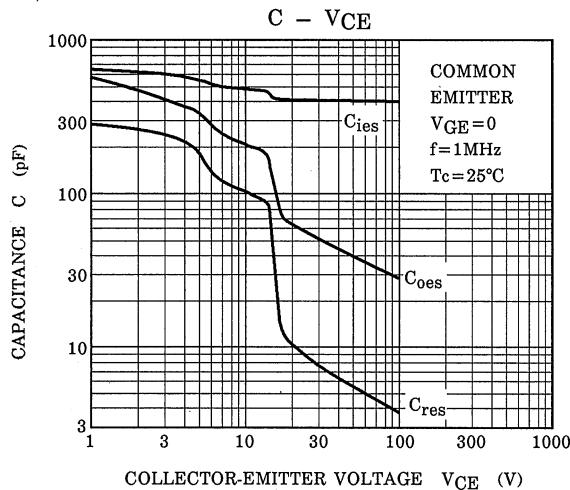


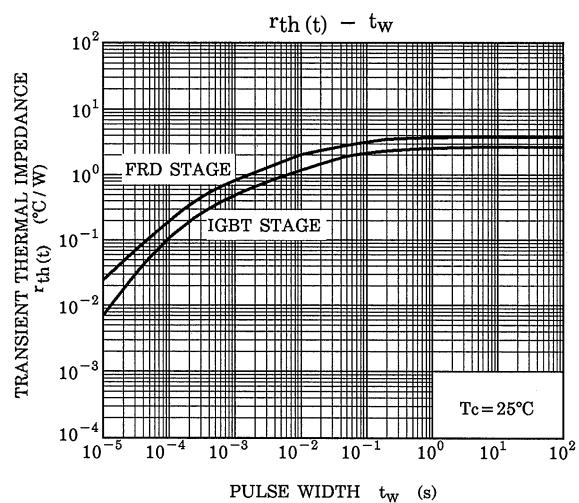
Switching loss measurement waveforms











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