

**TENTATIVE**

TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR  
SILICON N CHANNEL IGBT

## GT5J311,GT5J311(SM)

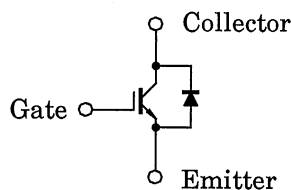
HIGH POWER SWITCHING APPLICATIONS  
MOTOR CONTROL APPLICATIONS

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

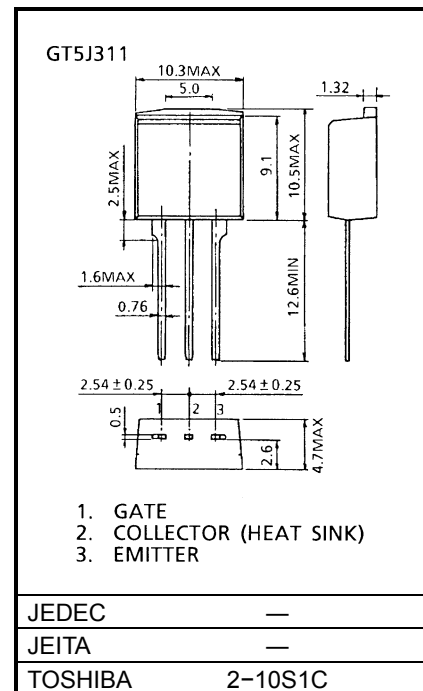
### MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	$V_{CES}$	600	V
Gate-Emitter Voltage	$V_{GES}$	$\pm 20$	V
Collector Current	DC	$I_C$	5 A
	1ms	$I_{CP}$	10 A
Emitter-Collector Forward Current	DC	$I_F$	5 A
	1ms	$I_{FM}$	10 A
Collector Power Dissipation ( $T_c = 25^\circ\text{C}$ )	$P_C$	45	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ\text{C}$

### EQUIVALENT CIRCUIT

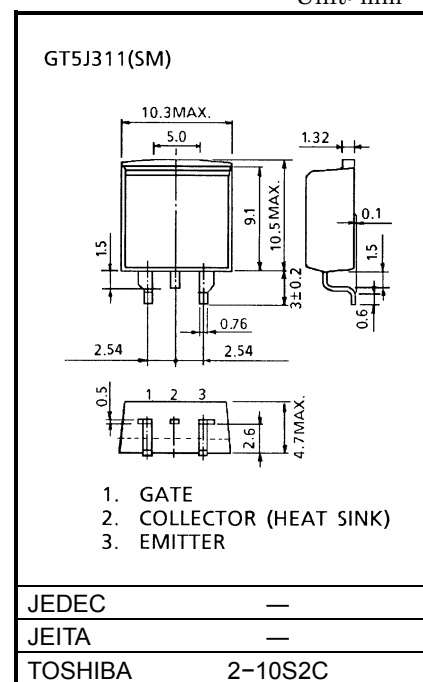


Unit: mm



Weight: 1.5g

Unit: mm

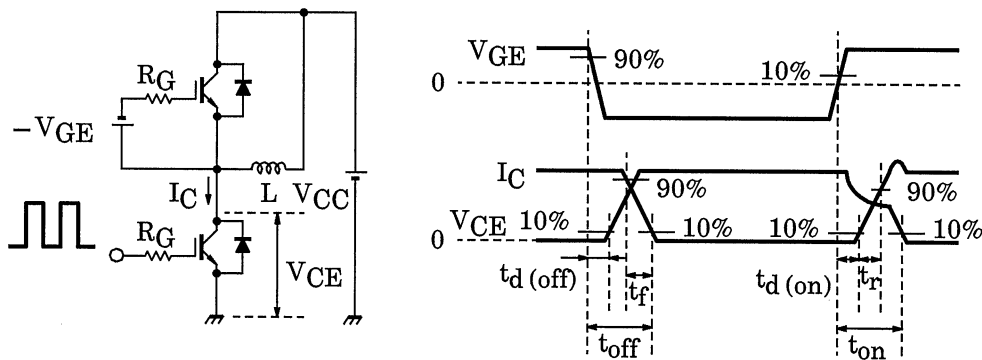


Weight: 1.4g

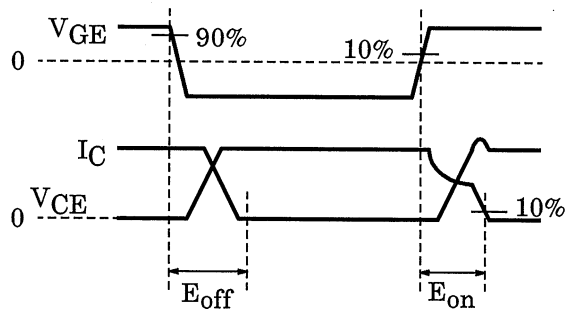
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

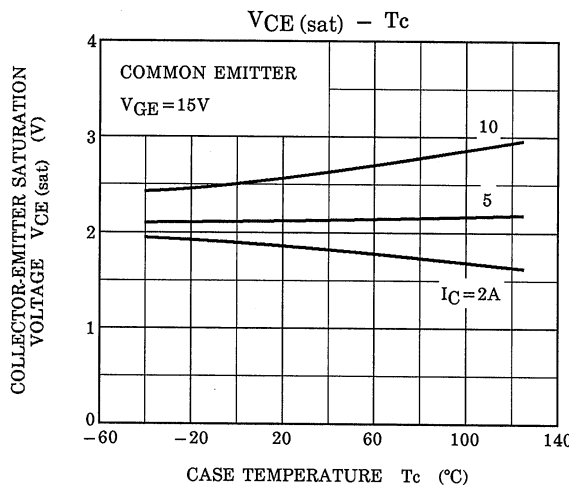
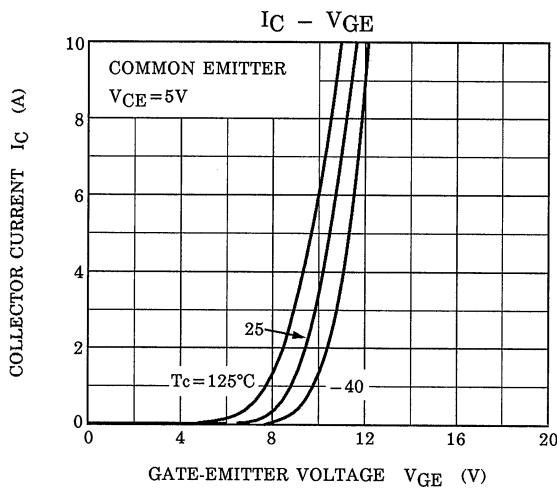
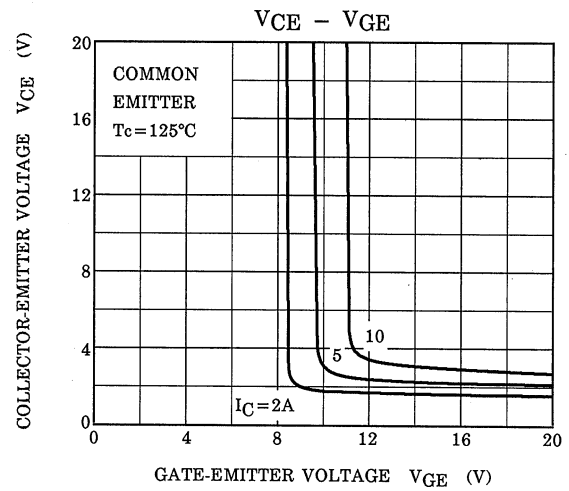
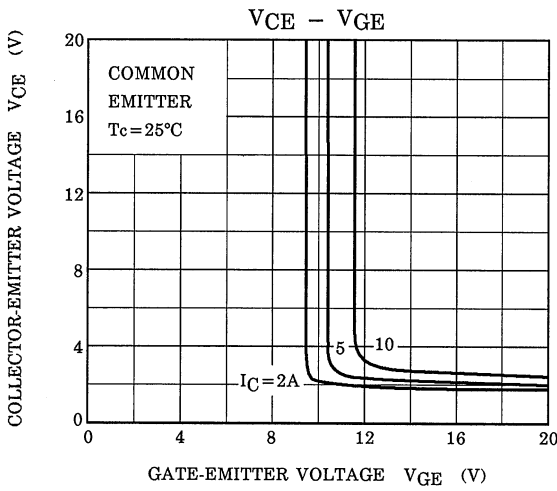
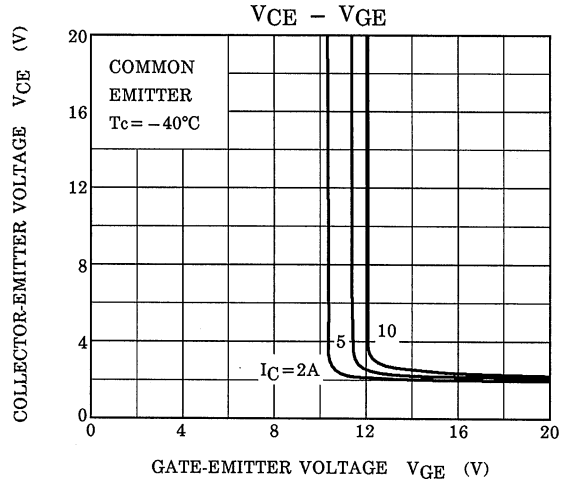
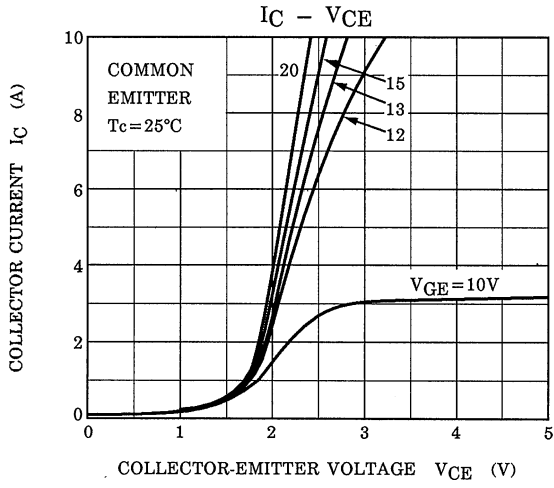
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Gate Leakage Current		$I_{GES}$	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector Cut-Off Current		$I_{CES}$	$V_{CE} = 600V, V_{GE} = 0$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		$V_{GE(OFF)}$	$I_C = 0.5mA, V_{CE} = 5V$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	$I_C = 5A, V_{GE} = 15V$	—	2.1	2.7	V
Input Capacitance		$C_{ies}$	$V_{CE} = 20V, V_{GE} = 0, f = 1MHz$	—	650	—	pF
Switching Time	Rise Time	$t_r$	Inductive Load $V_{CC} = 300V, I_C = 5A$ $V_{GG} = \pm 15V, R_G = 180\Omega$  (Note 1)	—	0.12	—	$\mu s$
	Turn-On Time	$t_{on}$		—	0.40	—	
	Fall Time	$t_f$		—	0.15	0.30	
	Turn-Off Time	$t_{off}$		—	0.50	—	
Peak Forward Voltage		$V_F$	$I_F = 5A, V_{GE} = 0$	—	—	1.8	V
Reverse Recovery Time		$t_{rr}$	$I_F = 5A, di/dt = -100A/\mu s$	—	—	200	ns
Thermal Resistance (IGBT)		$R_{th(j-c)}$	—	—	—	2.8	°C/W
Thermal Resistance (Diode)		$R_{th(j-c)}$	—	—	—	3.76	°C/W

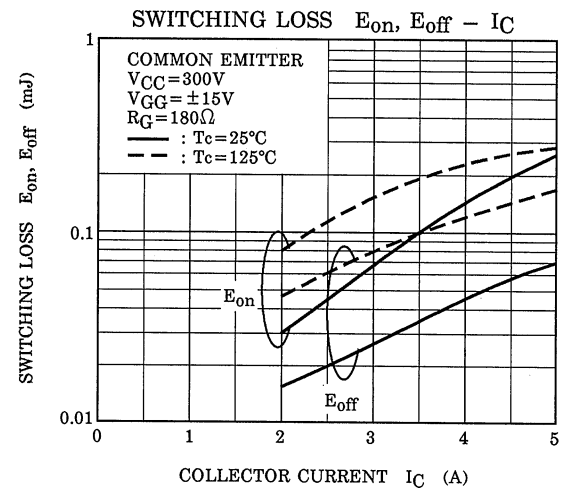
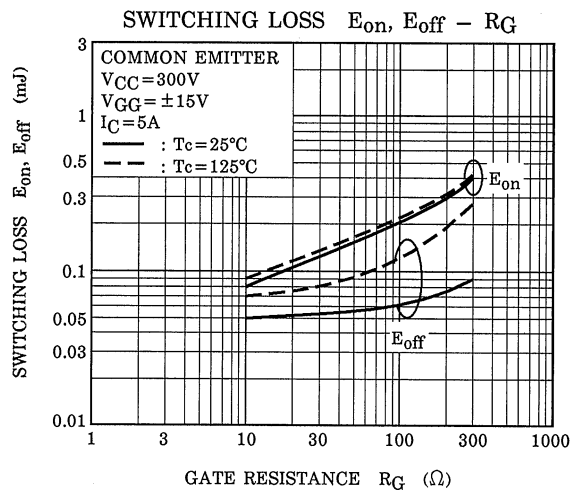
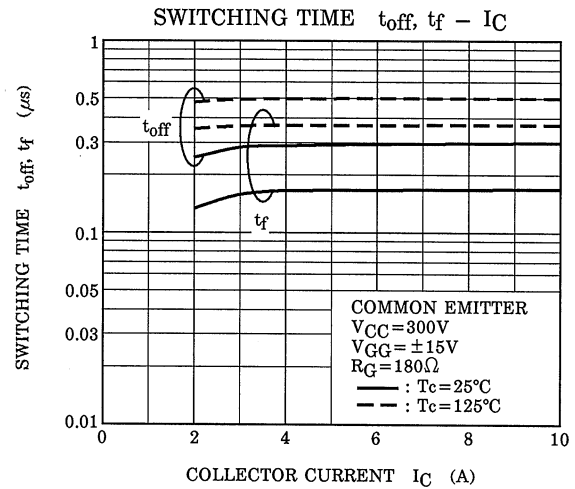
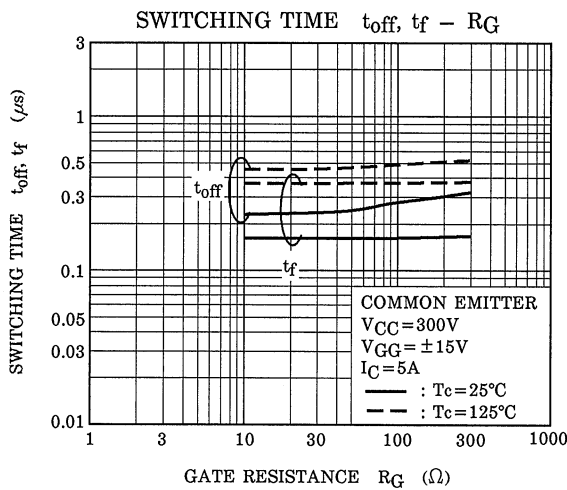
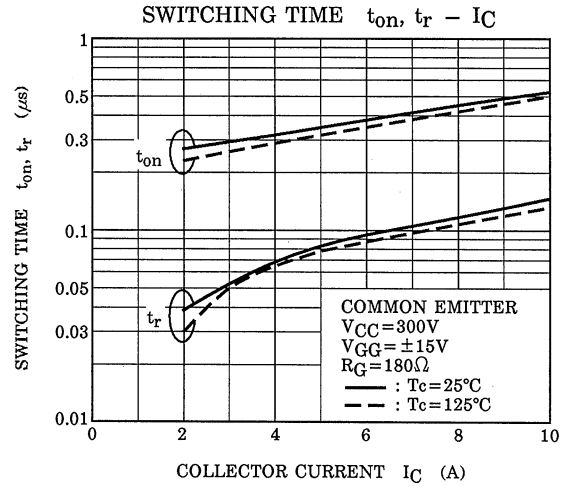
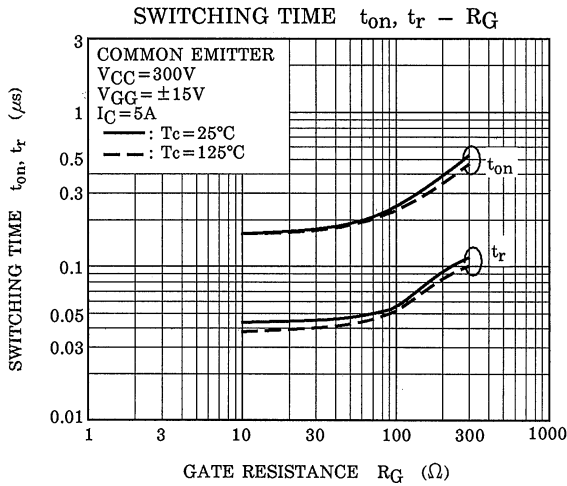
Note 1: Switching time measurement circuit and input / output waveforms

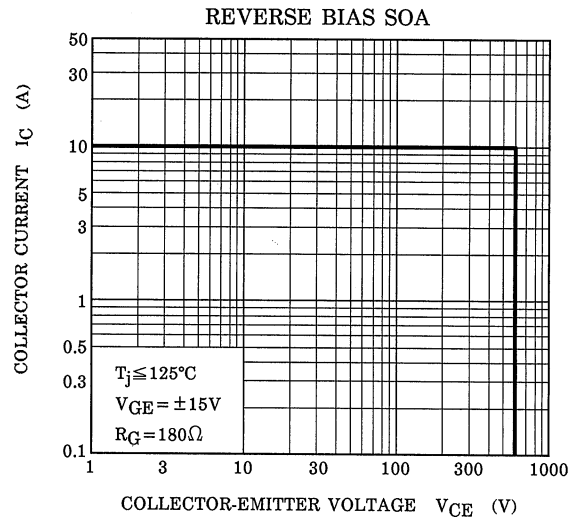
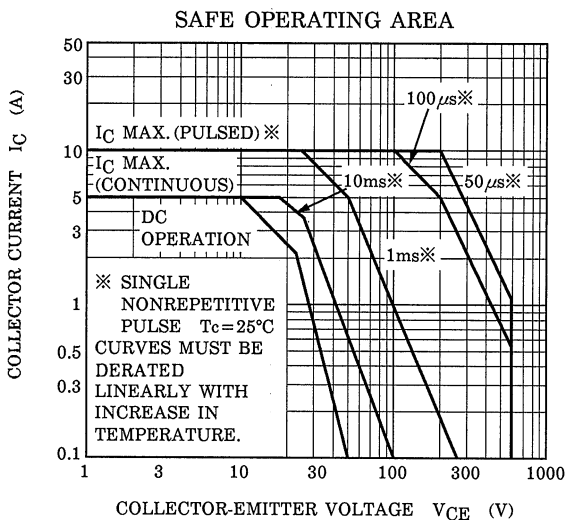
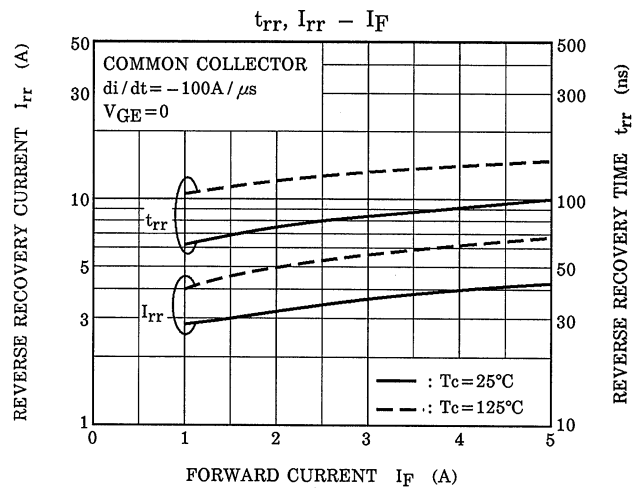
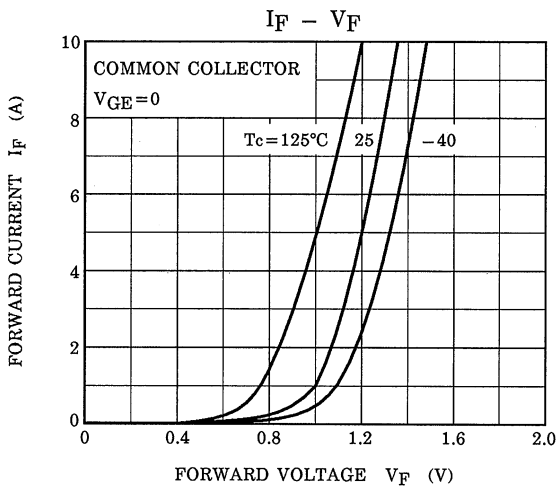
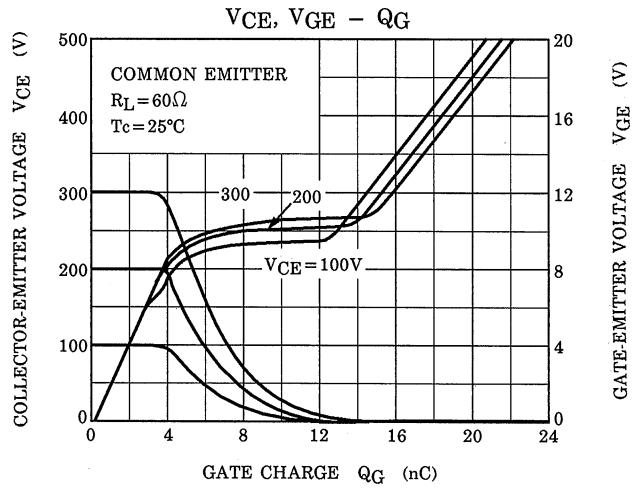
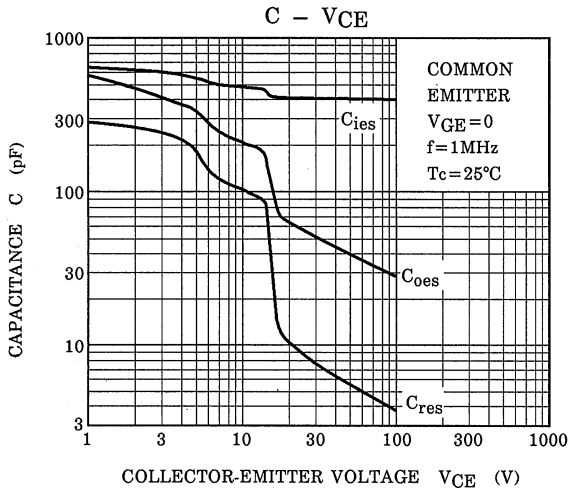


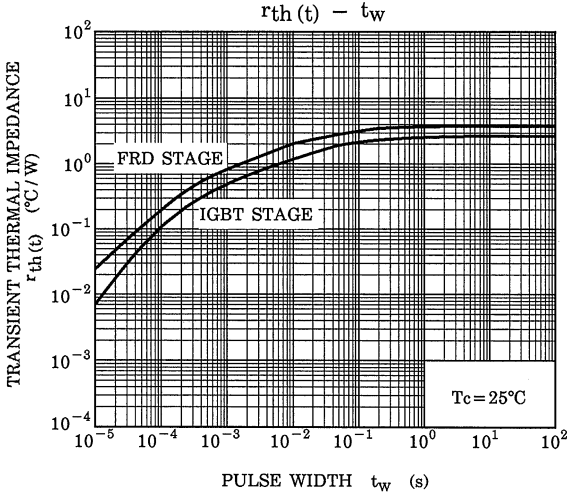
Switching loss measurement waveforms











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