

TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL IGBT

# GT15J311, GT15J311(SM)

HIGH POWER SWITCHING APPLICATIONS  
MOTOR CONTROL APPLICATIONS

- Third-generation IGBT
- Enhancement mode type
- High speed :  $t_f = 0.30\mu s$  (Max.) ( $I_C = 15A$ )
- Low saturation voltage :  $V_{CE(sat)} = 2.7V$  (Max.) ( $I_C = 15A$ )
- FRD included between emitter and collector

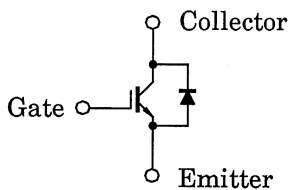
### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	$V_{CES}$	600	V
Gate-Emitter Voltage	$V_{GES}$	$\pm 20$	V
Collector Current	DC	$I_C$	15 A
	1ms	$I_{CP}$	30 A
Emitter-Collector	DC	$I_F$	15 A
Forward Current	1ms	$I_{FM}$	30 A
Collector Power Dissipation ( $T_c = 25^\circ C$ )	$P_C$	70	W
Junction Temperature	$T_j$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$

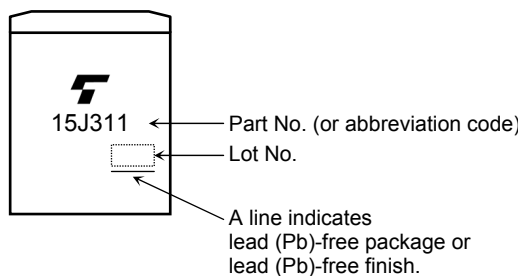
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

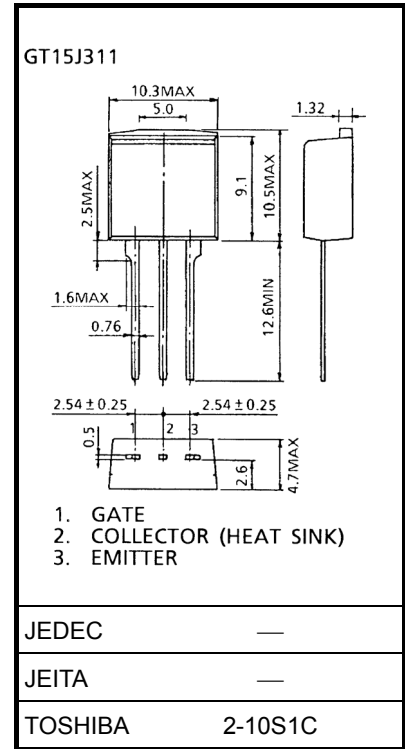
### Equivalent Circuit



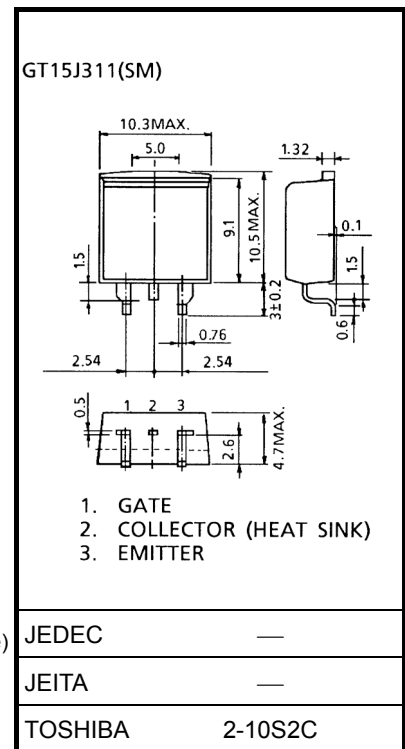
### Marking



Unit: mm



Weight: 1.5 g (typ.)

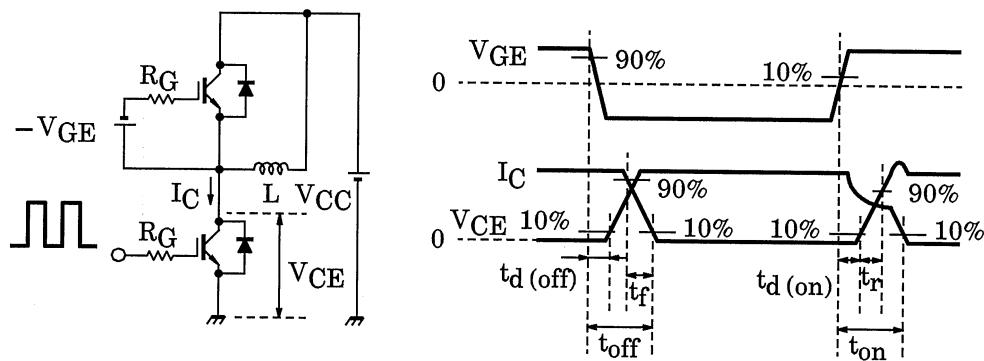


Weight: 1.4 g (typ.)

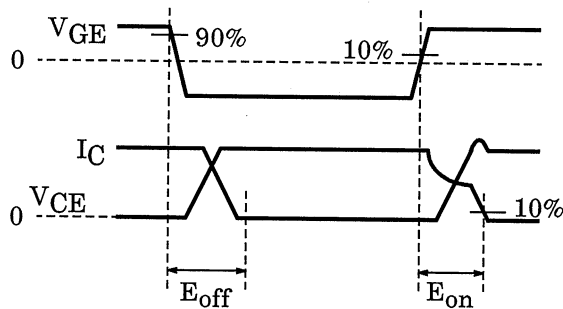
## Electrical Characteristics (Ta = 25°C)

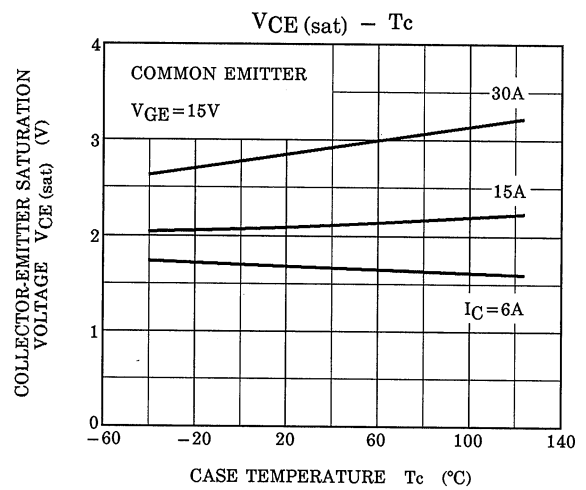
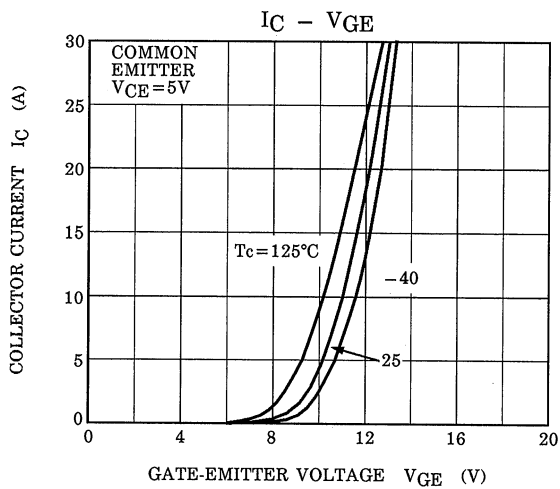
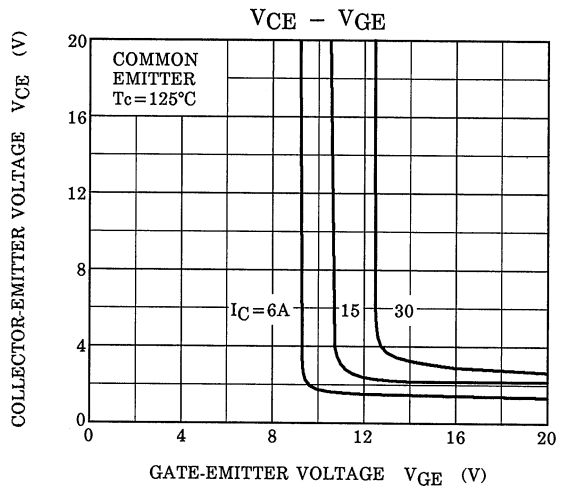
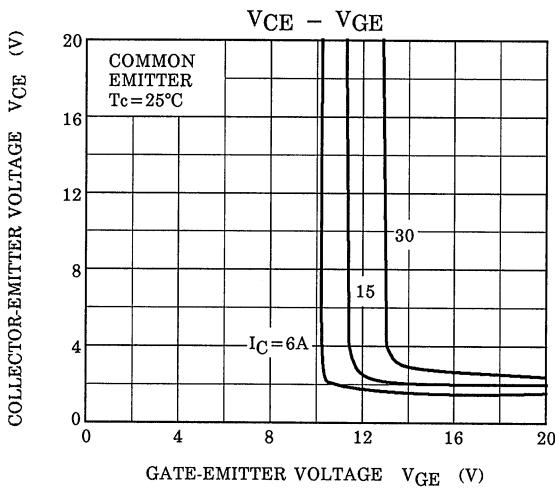
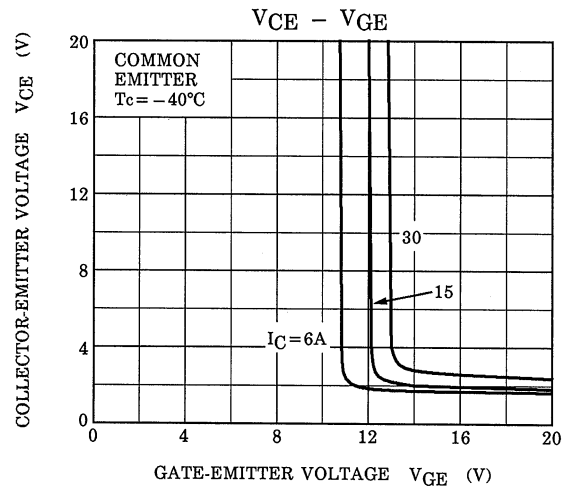
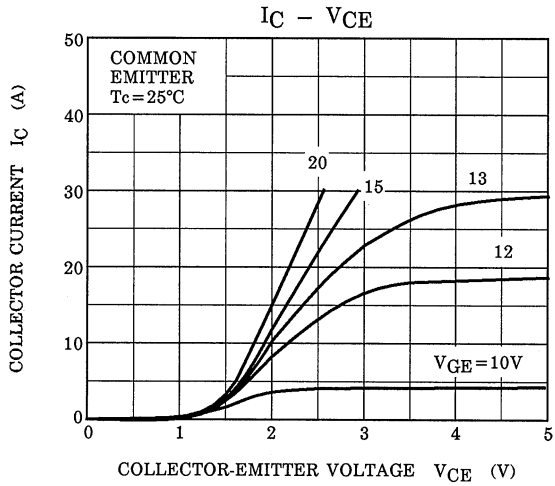
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Gate Leakage Current		$I_{GES}$	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector Cut-Off Current		$I_{CES}$	$V_{CE} = 600V, V_{GE} = 0$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		$V_{GE(OFF)}$	$I_C = 1.5mA, V_{CE} = 5V$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	$I_C = 15A, V_{GE} = 15V$	—	2.1	2.7	V
Input Capacitance		$C_{ies}$	$V_{CE} = 20V, V_{GE} = 0, f = 1MHz$	—	950	—	pF
Switching Time	Rise Time	$t_r$	Inductive Load $V_{CC} = 300V, I_C = 15A$ $V_{GG} = \pm 15V, R_G = 75\Omega$ (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		$V_F$	$I_F = 15A, V_{GE} = 0$	—	—	2.0	V
Reverse Recovery Time		$t_{rr}$	$I_F = 15A, di/dt = -100A/\mu s$	—	—	200	ns
Thermal Resistance (IGBT)		$R_{th(j-c)}$	—	—	—	1.79	°C/W
Thermal Resistance (Diode)		$R_{th(j-c)}$	—	—	—	3.45	°C/W

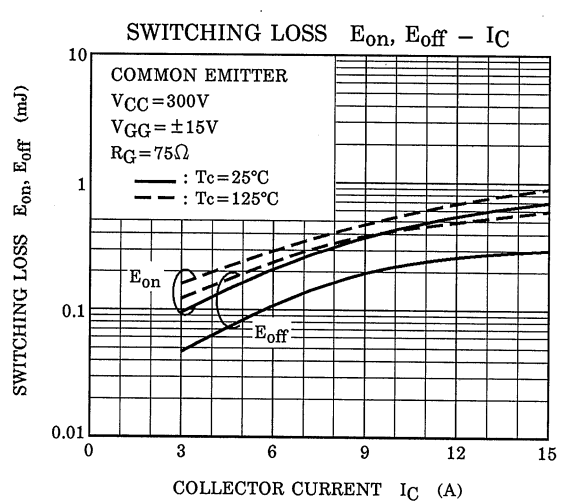
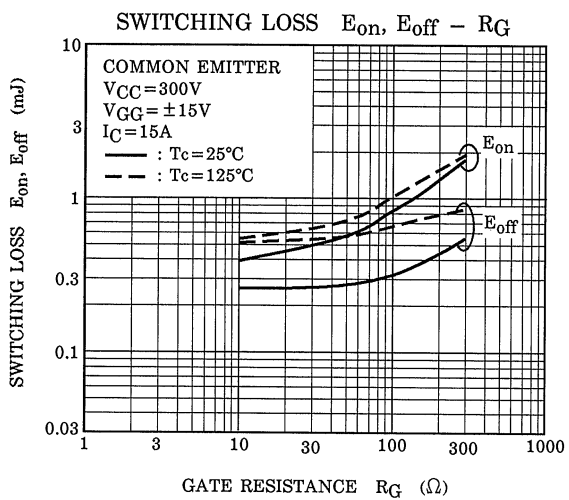
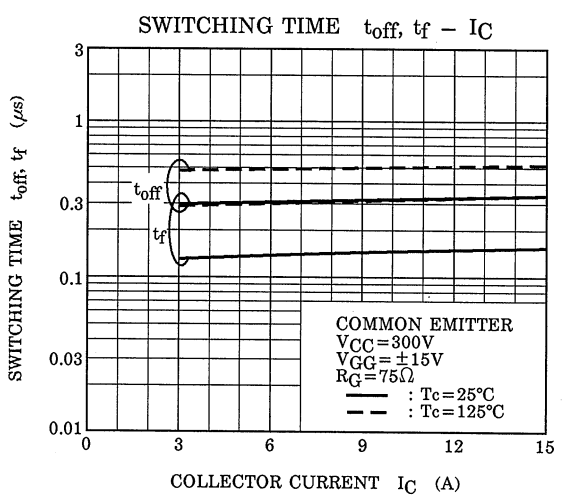
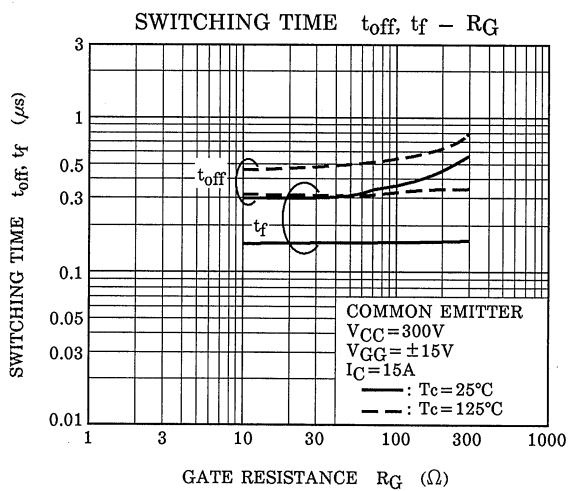
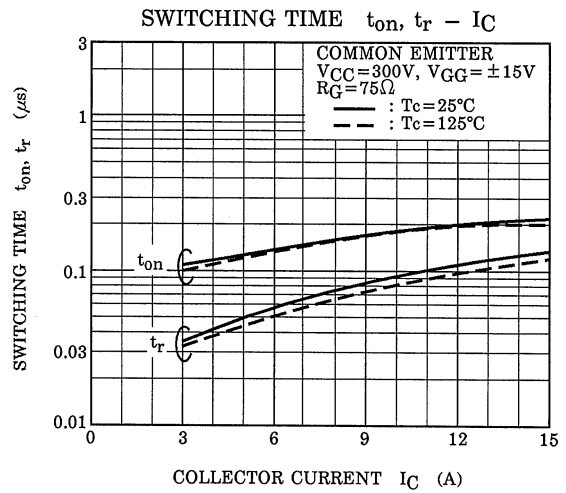
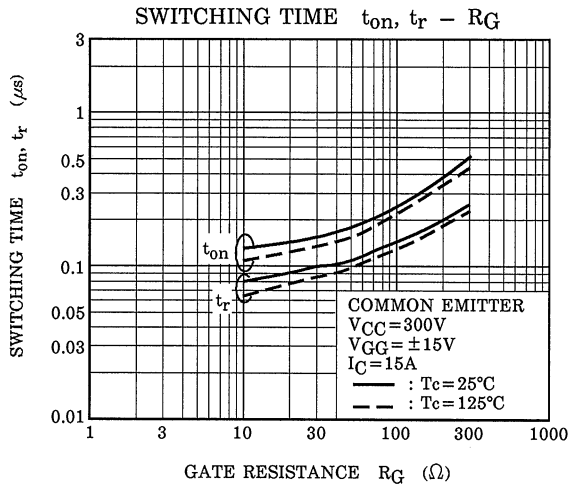
Note 1: Switching time measurement circuit and input / output waveforms

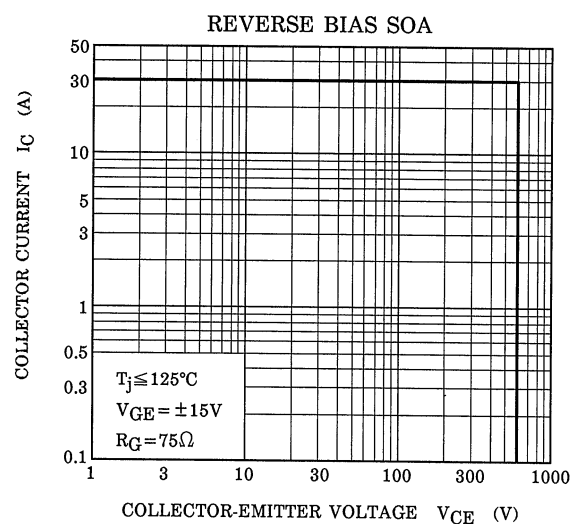
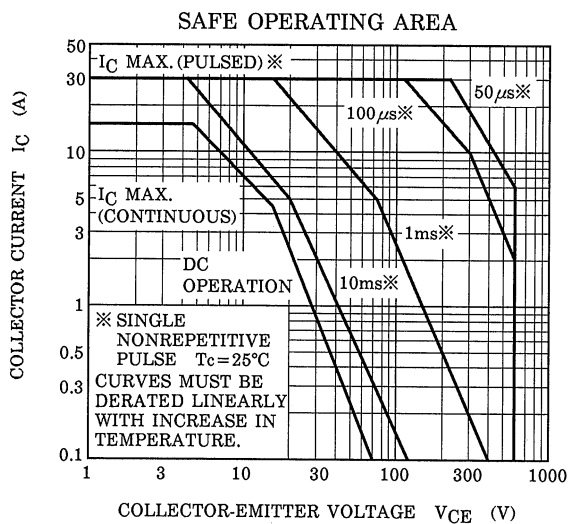
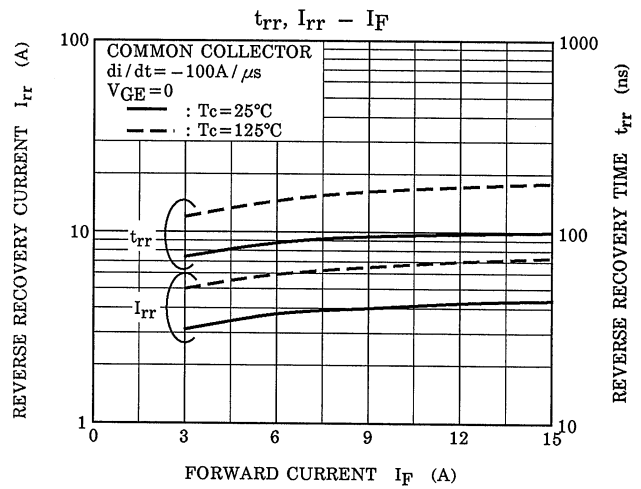
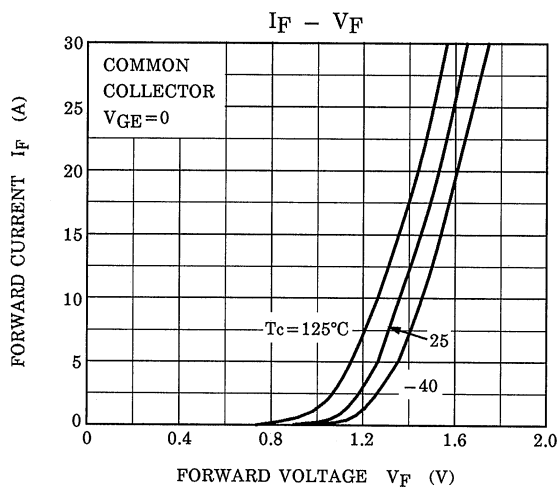
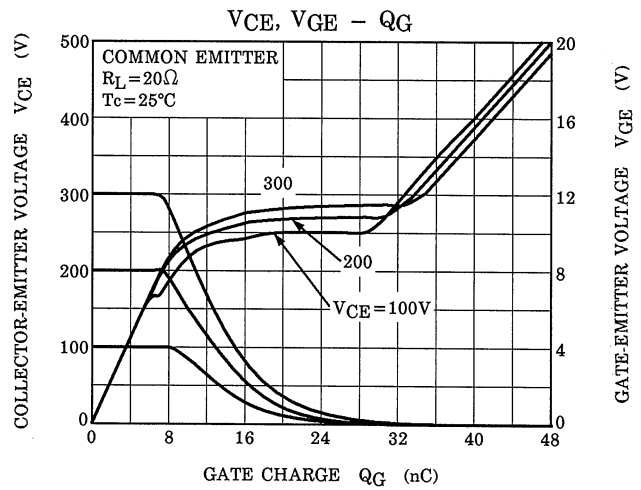
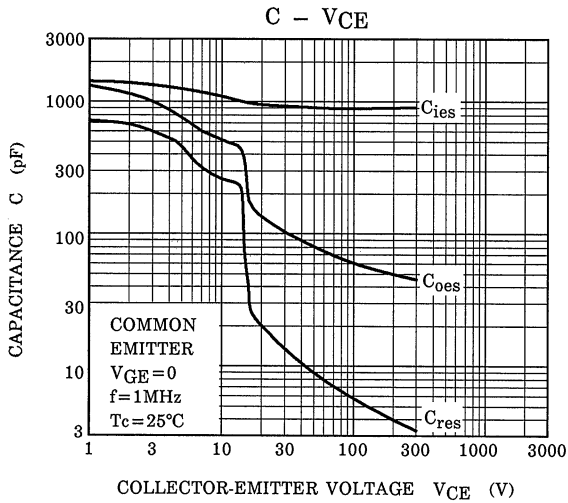


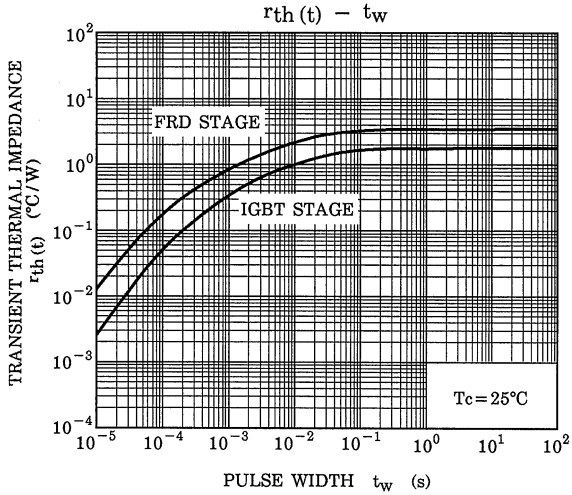
Switching loss measurement waveforms











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