2SH11
Silicon N-Channel IGBT

HITACHI

1st. Edition
Feb. 1995

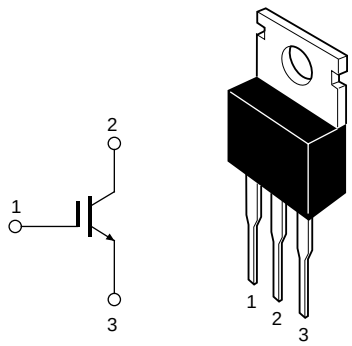
Application

High speed power switching

Features

- High speed switching
- Low on saturation voltage

TO–220AB



1. Gate
2. Collector
3. Emitter

Table 1 Absolute Maximum Ratings (Ta = 25°C)

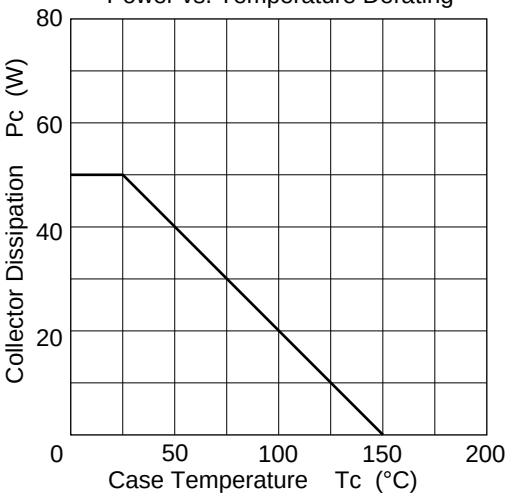
Item	Symbol	Ratings	Unit
Collector to emitter voltage	V_{CES}	600	V
Gate to emitter voltage	V_{GES}	±20	V
Collector current	I_C	10	A
Collector peak current	ic(peak)	20	A
Collector dissipation	P_C*	50	W
Channel temperature	T_j	150	°C
Storage temperature	Tstg	–55 to +150	°C

* Value at Tc = 25°C

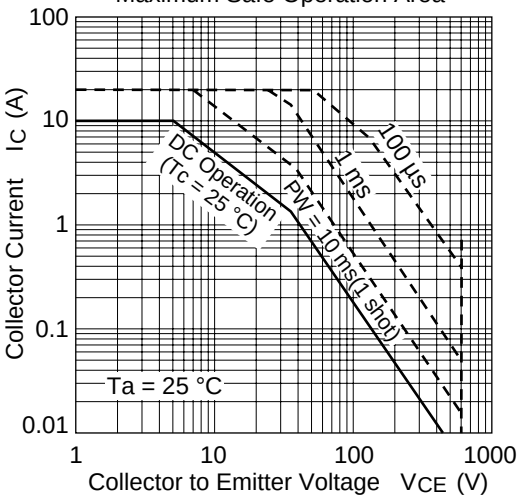
Table 2 Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to emitter breakdown voltage	$V_{(BR)CES}$	600	—	—	V	I_C = 100 µA, V_{GE} = 0
Zero gate voltage collector current	I_{CES}	—	—	0.5	mA	V_{CE} = 600 V, V_{GE} = 0
Gate to emitter leak current	I_{GES}	—	—	±1	µA	V_{GE} = ±20 V, V_{CE} = 0
Gate to emitter cutoff current	$V_{GE(off)}$	3.0	—	5.0	V	I_C = 1 mA, V_{CE} = 10 V
Collector to emitter saturation voltage	$V_{CE(sat)}$[1]	—	2.0	—	V	I_C = 5 A, V_{GE} = 15 V
Collector to emitter saturation voltage	$V_{CE(sat)}$[2]	—	2.6	3.3	V	I_C = 10 A, V_{GE} = 15 V
Input capacitance	Cies	—	1000	—	pF	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz
Switching time	t_r	—	75	—	ns	I_C = 10 A,
	t_{on}	—	150	—		R_L = 30 Ω,
	t_f	—	300	600		V_{GE} = ±15 V
	t_{off}	—	450	900		Rg = 50 Ω

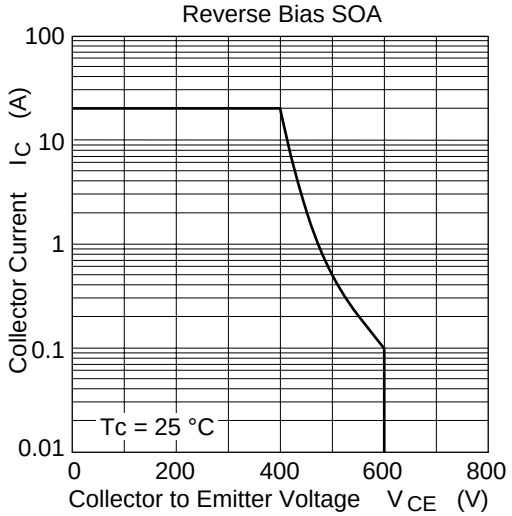
Power vs. Temperature Derating



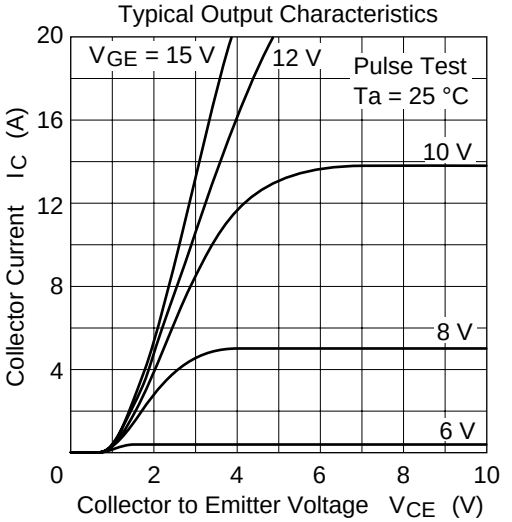
Maximum Safe Operation Area



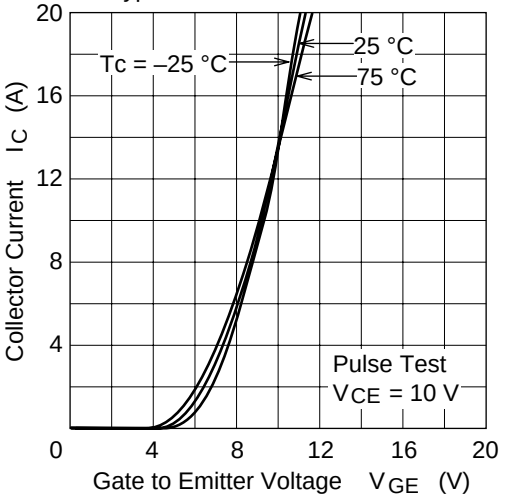
Reverse Bias SOA



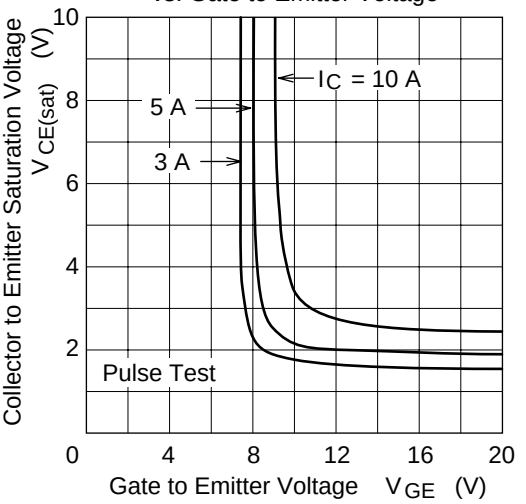
Typical Output Characteristics



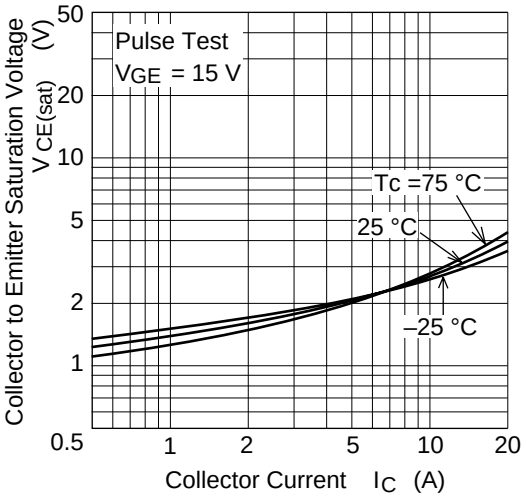
Typical Transfer Characteristics



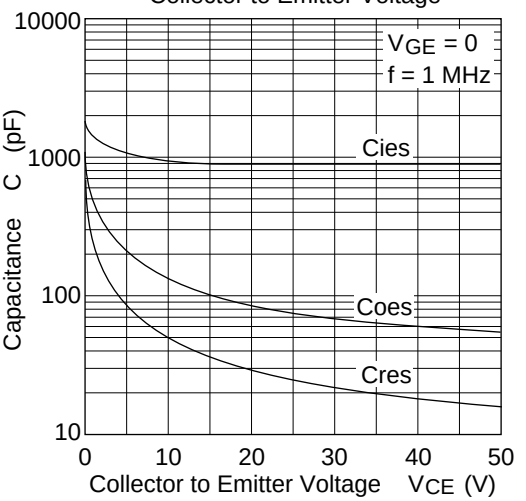
Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage



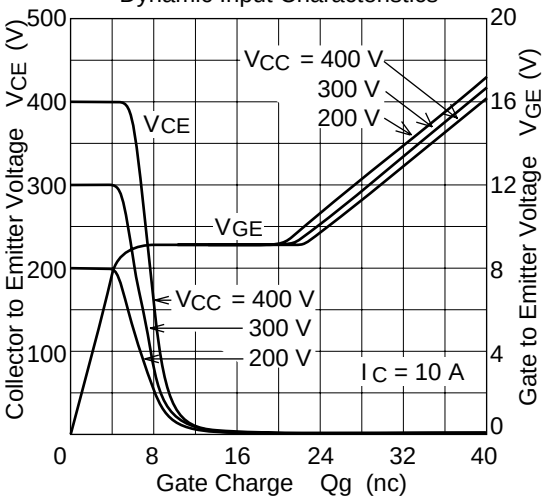
Collector to Emitter Saturation Voltage vs. Collector Current



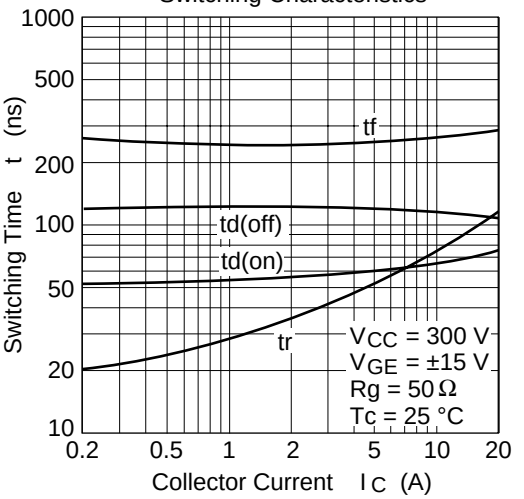
Typical Capacitance vs. Collector to Emitter Voltage



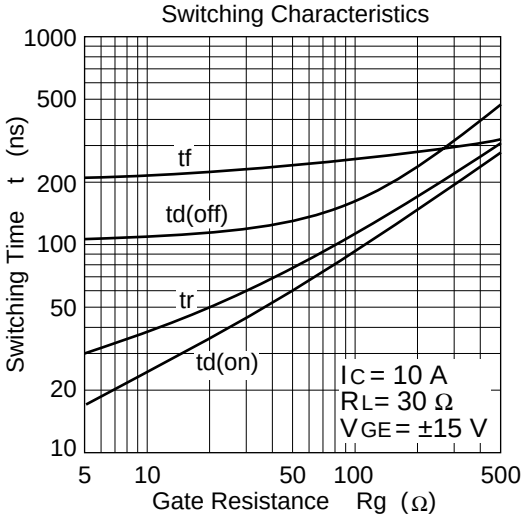
Dynamic Input Characteristics



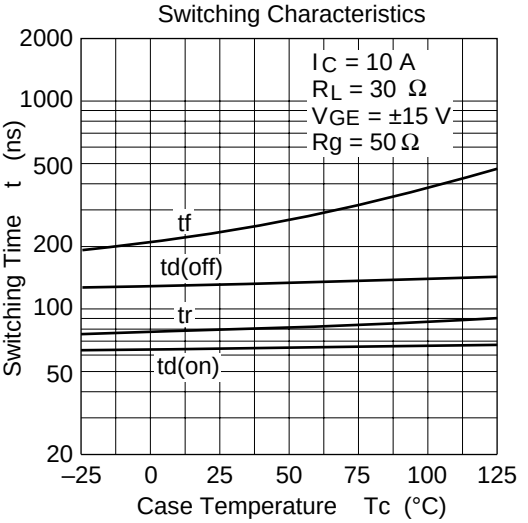
Switching Characteristics

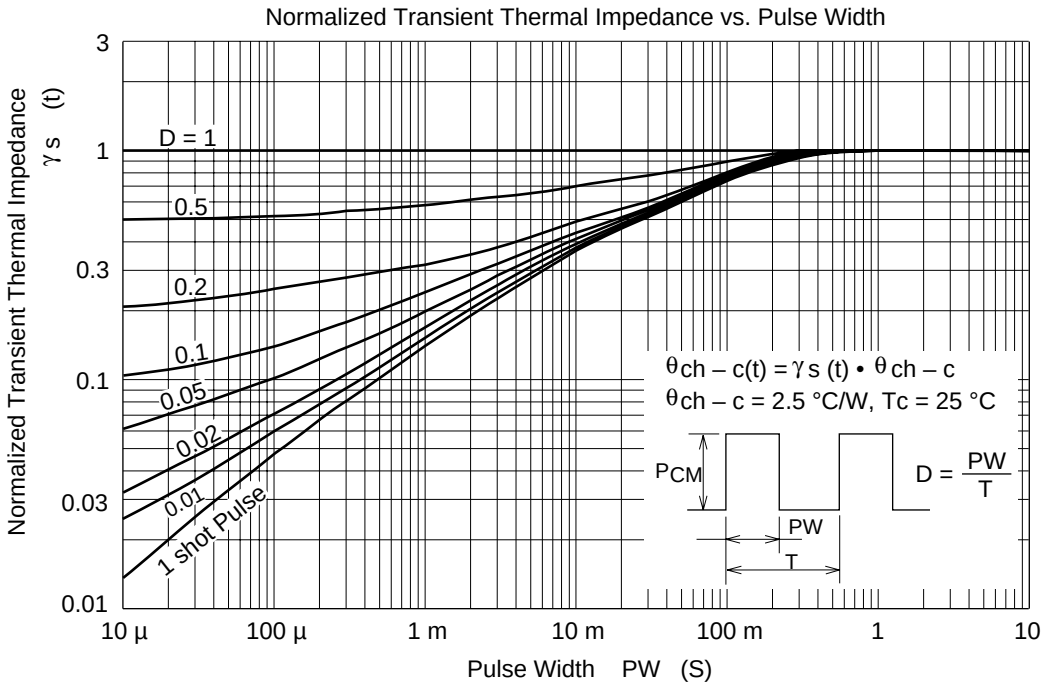


Switching Characteristics



Switching Characteristics

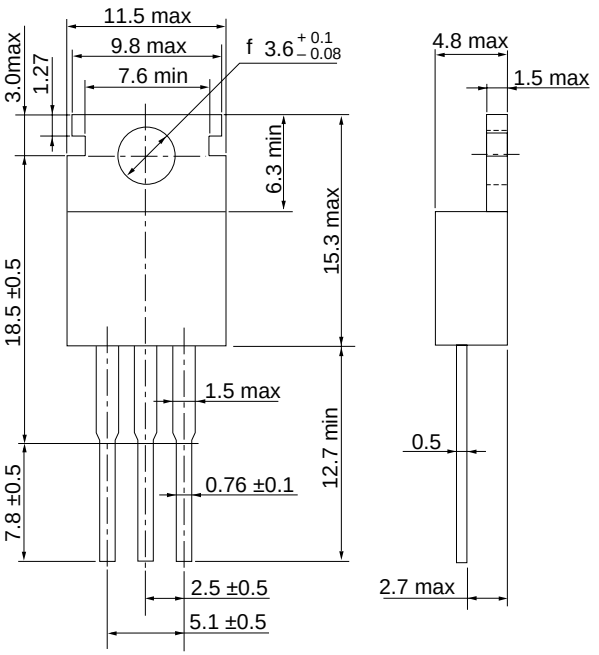


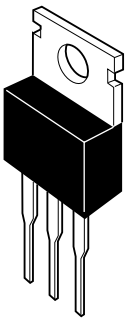

Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermal Impedance γs (t)
3
1
0.3
0.1
0.03
0.01
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1 shot Pulse
θch – c(t) = γs (t) • θch – c
θch – c = 2.5 °C/W, Tc = 25 °C
PCM
D = PW/T
PW
T
10 µ
100 µ
1 m
10 m
100 m
1
10
Pulse Width PW (S)

Package Dimensions

Unit : mm

• TO–220AB





Hitachi Code	TO–220AB
EIAJ	SC–46
JEDEC	—

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