

# 2SH28

## Silicon N Channel IGBT High Speed Power Switching

# HITACHI

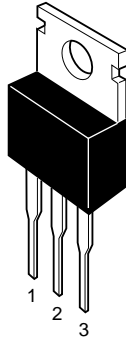
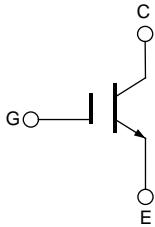
ADE-208-790A(Z)  
2nd. Edition  
May 1999

### Features

- High speed switching
- Low on-voltage

### Outline

TO-220AB



1. Gate
2. Collector (Flange)
3. Emitter

**Absolute Maximum Ratings** ( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Ratings	Unit
Collector to Emitter voltage	$V_{CES}$	600	V
Gate to Emitter voltage	$V_{GES}$	$\pm 20$	V
Collector current	$I_C$	20	A
Collector peak current	$i_{c(\text{peak})}$	40	A
Collector dissipation	$P_C$ <sup>Note1</sup>	60	W
Channel temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$

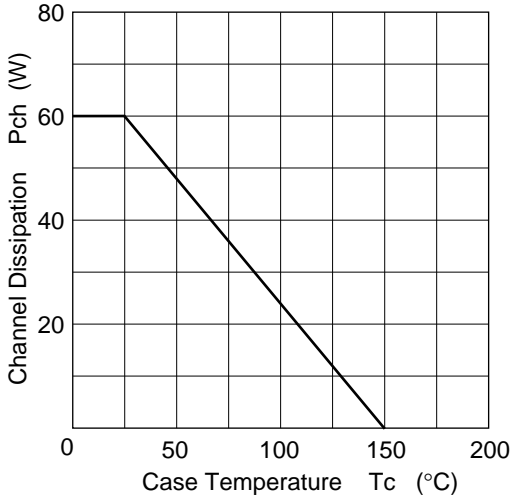
Note: 1. Value at  $T_c = 25^\circ\text{C}$

**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ )

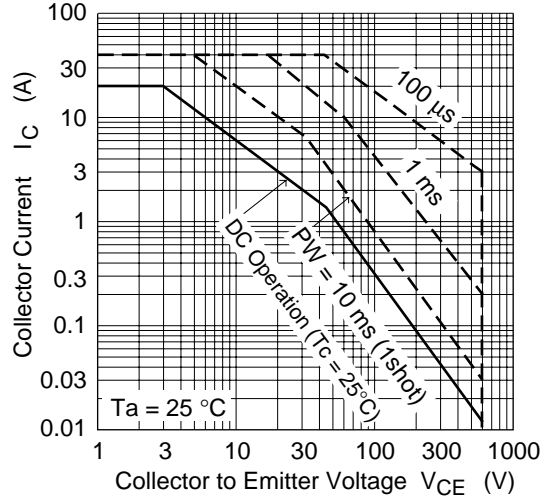
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current	$I_{CES}$	—	—	100	$\mu\text{A}$	$V_{CE} = 600\text{V}, V_{GE} = 0$
Gate to emitter leak current	$I_{GES}$	—	—	$\pm 1$	$\mu\text{A}$	$V_{GE} = \pm 20\text{V}, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(\text{off})}$	6.0	—	8.0	V	$I_C = 20\text{mA}, V_{CE} = 10\text{V}$
Collector to emitter saturation voltage	$V_{CE(\text{sat})}$	—	2.1	2.6	V	$I_C = 20\text{A}, V_{GE} = 15\text{V}$
Input capacitance	$C_{ies}$	—	1200	—	pF	$V_{CE} = 10\text{V}, V_{GE} = 0$ $f = 1\text{MHz}$
Switching time	$t_r$	—	150	—	ns	$I_C = 20\text{A}$
	$t_{on}$	—	230	—	ns	$R_L = 15\ \Omega$
	$t_f$	—	300	600	ns	$V_{GS} = \pm 15\text{V}$
	$t_{off}$	—	450	900	ns	$R_g = 50\ \Omega$

Main Characteristics

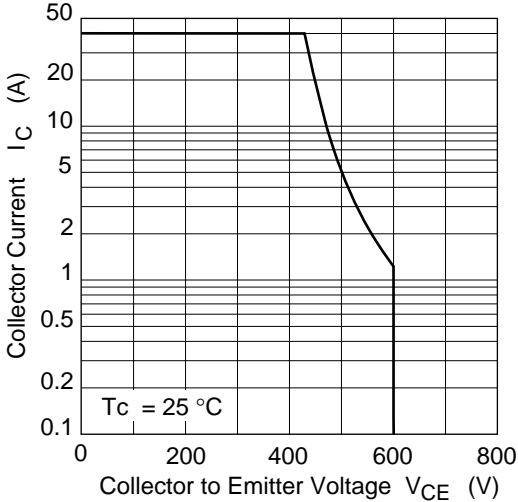
Power vs. Temperature Derating



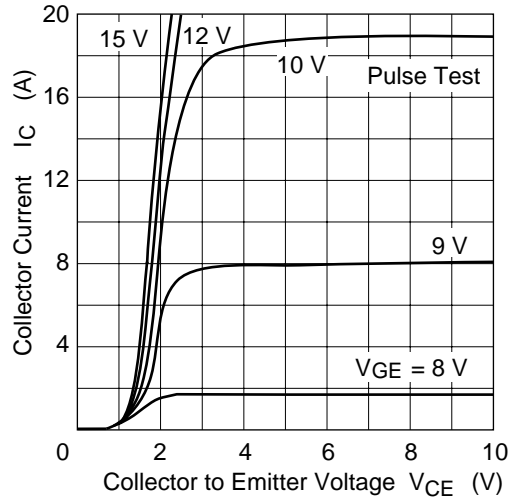
Maximum Safe Operation Area

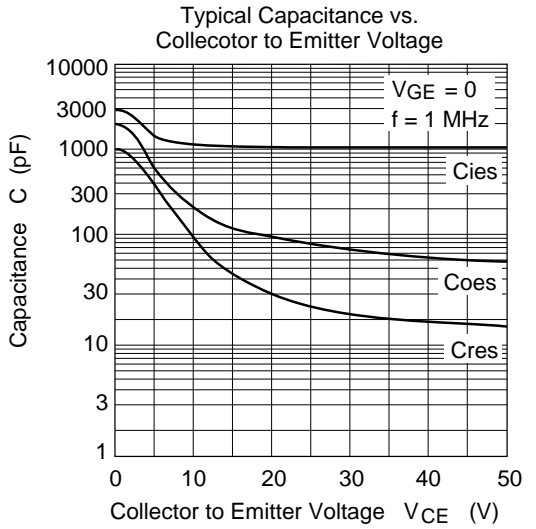
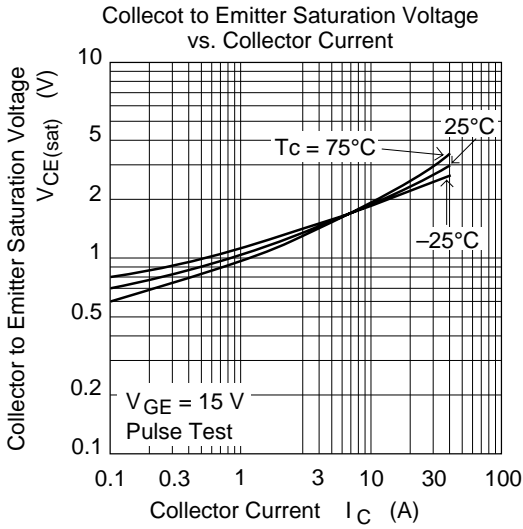
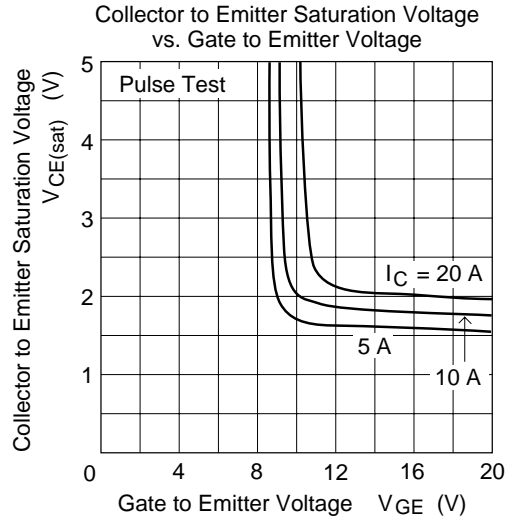
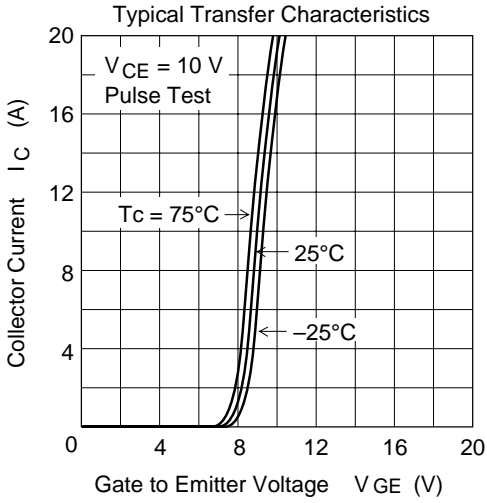


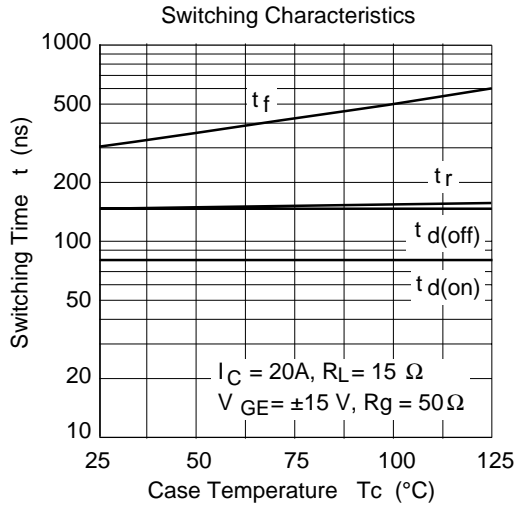
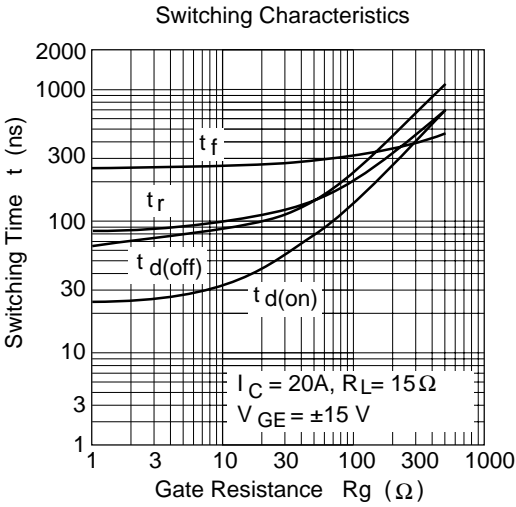
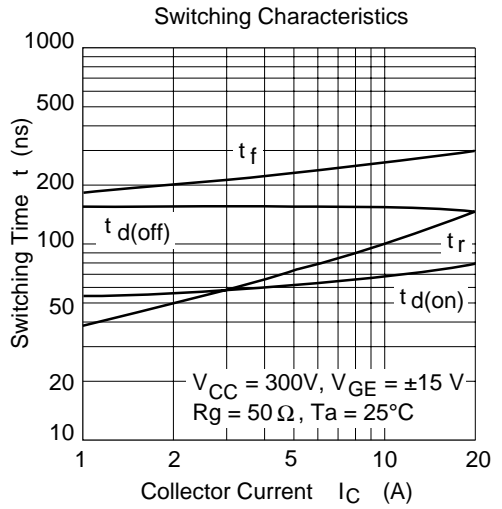
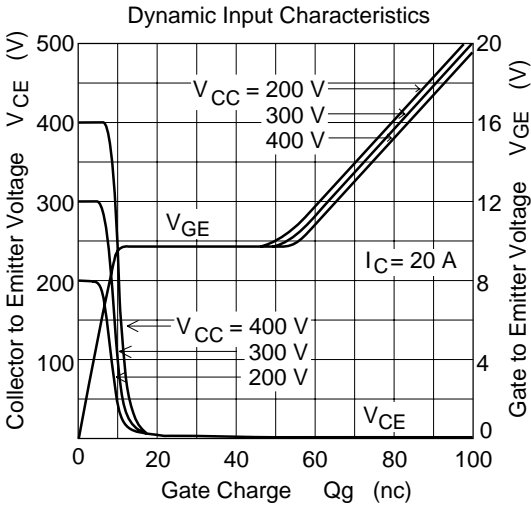
Reverse Bias SOA



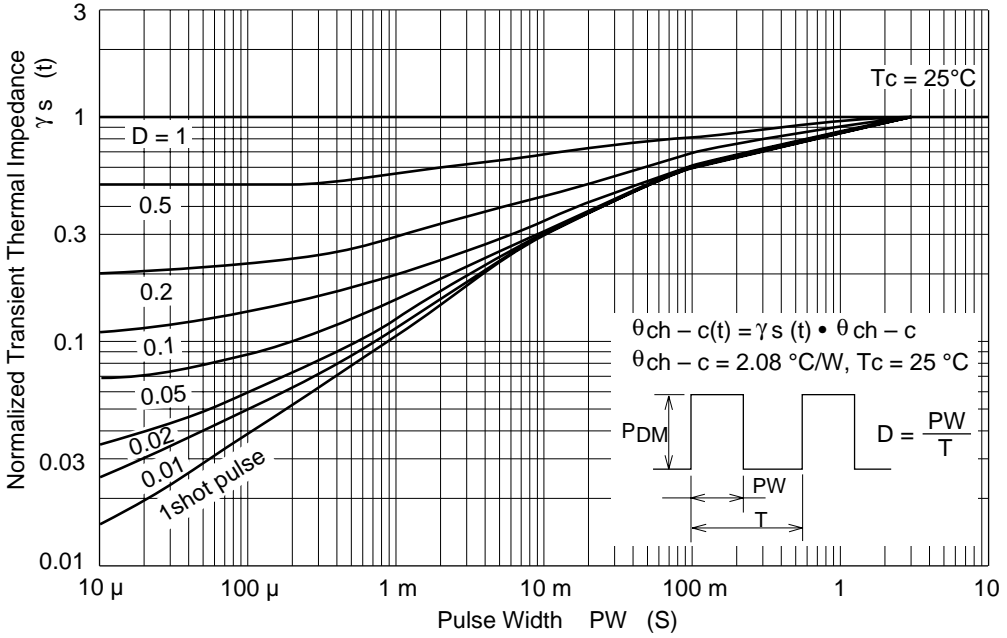
Typical Output Characteristics



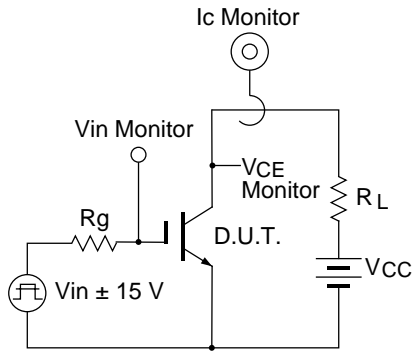




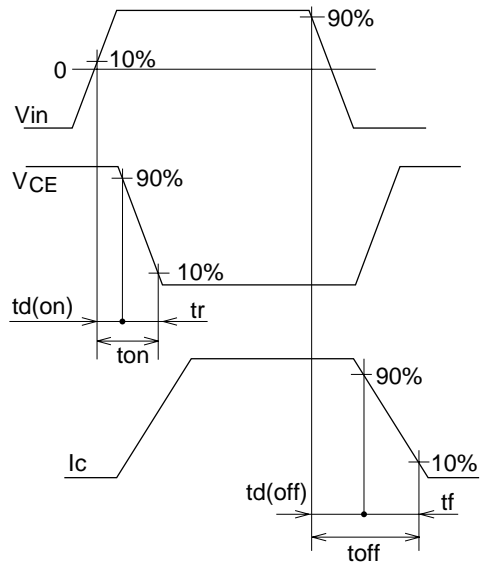
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

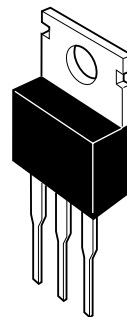
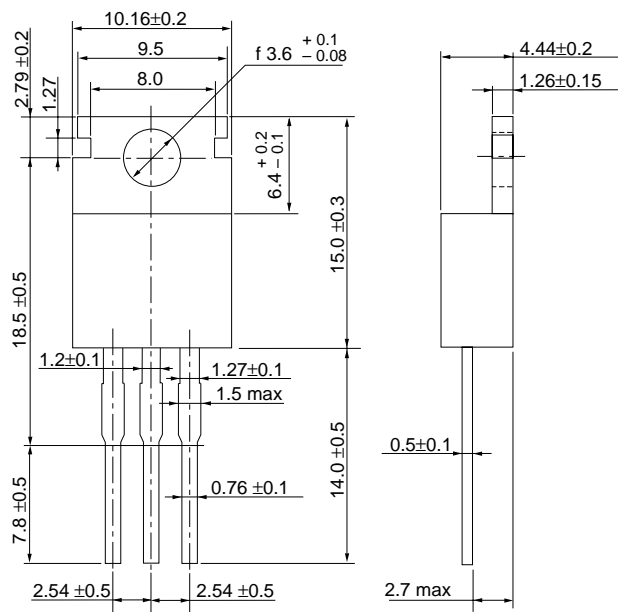


Waveform



## Package Dimensions

Unit: mm



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

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