

# 2SH28

Silicon N Channel IGBT  
High Speed Power Switching

# HITACHI

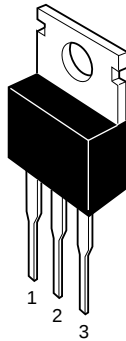
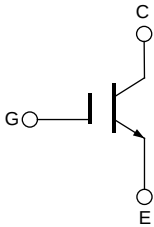
ADE-208-790A(Z)  
2nd. Edition  
May 1999

## Features

- High speed switching
- Low on-voltage

## Outline

TO-220AB



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

Absolute Maximum Ratings (Ta = 25°C)

| Item                         | Symbol                          | Ratings     | Unit |
|------------------------------|---------------------------------|-------------|------|
| Collector to Emitter voltage | V <sub>CES</sub>                | 600         | V    |
| Gate to Emitter voltage      | V <sub>GES</sub>                | ±20         | V    |
| Collector current            | I <sub>C</sub>                  | 20          | A    |
| Collector peak current       | ic(peak)                        | 40          | A    |
| Collector dissipation        | P <sub>C</sub> <sup>Note1</sup> | 60          | W    |
| Channel temperature          | Tj                              | 150         | °C   |
| Storage temperature          | Tstg                            | −55 to +150 | °C   |

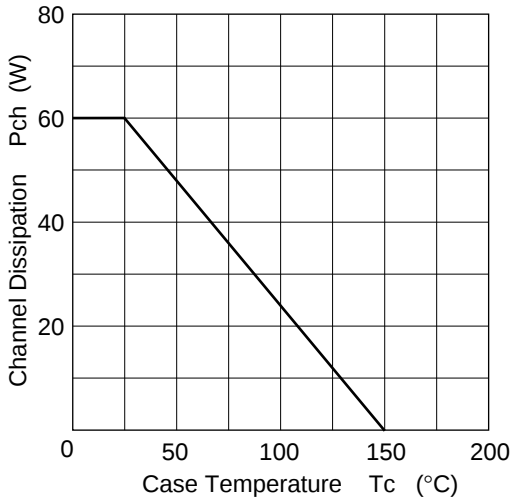
Note: 1. Value at Tc = 25°C

Electrical Characteristics (Ta = 25°C)

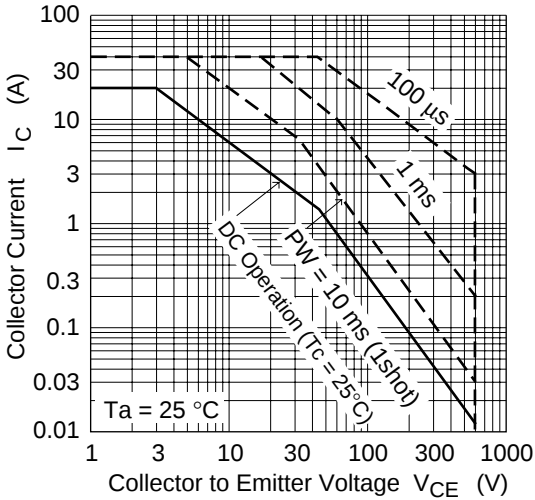
| Item                                    | Symbol               | Min | Typ  | Max | Unit | Test Conditions                                        |
|-----------------------------------------|----------------------|-----|------|-----|------|--------------------------------------------------------|
| Zero gate voltage collector current     | I <sub>CES</sub>     | —   | —    | 100 | μA   | V <sub>CE</sub> = 600V, V <sub>GE</sub> = 0            |
| Gate to emitter leak current            | I <sub>GES</sub>     | —   | —    | ±1  | μA   | V <sub>GE</sub> = ± 20 V, V <sub>CE</sub> = 0          |
| Gate to emitter cutoff voltage          | V <sub>GE(off)</sub> | 6.0 | —    | 8.0 | V    | I <sub>C</sub> = 20 mA, V <sub>CE</sub> = 10V          |
| Collector to emitter saturation voltage | V <sub>CE(sat)</sub> | —   | 2.1  | 2.6 | V    | I <sub>C</sub> = 20 A, V <sub>GE</sub> = 15V           |
| Input capacitance                       | Cies                 | —   | 1200 | —   | pF   | V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0<br>f = 1MHz |
| Switching time                          | t <sub>r</sub>       | —   | 150  | —   | ns   | I <sub>C</sub> = 20 A                                  |
|                                         | t <sub>on</sub>      | —   | 230  | —   | ns   | R <sub>L</sub> = 15 Ω                                  |
|                                         | t <sub>f</sub>       | —   | 300  | 600 | ns   | V <sub>GS</sub> = ±15V                                 |
|                                         | t <sub>off</sub>     | —   | 450  | 900 | ns   | Rg = 50 Ω                                              |

Main Characteristics

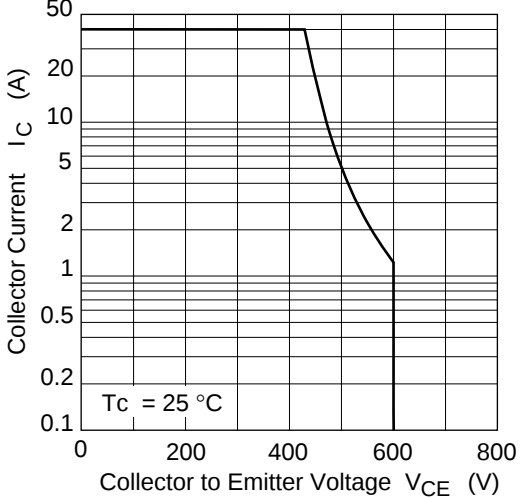
Power vs. Temperature Derating



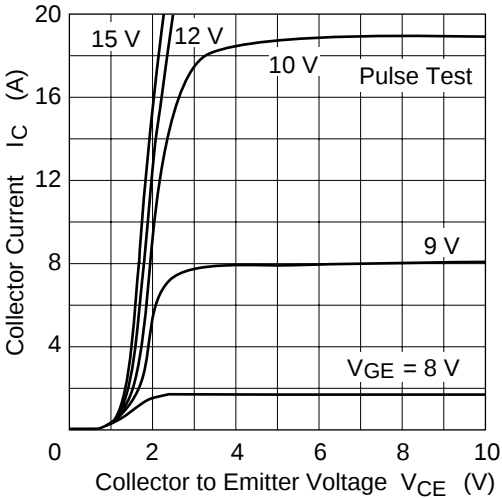
Maximum Safe Operation Area

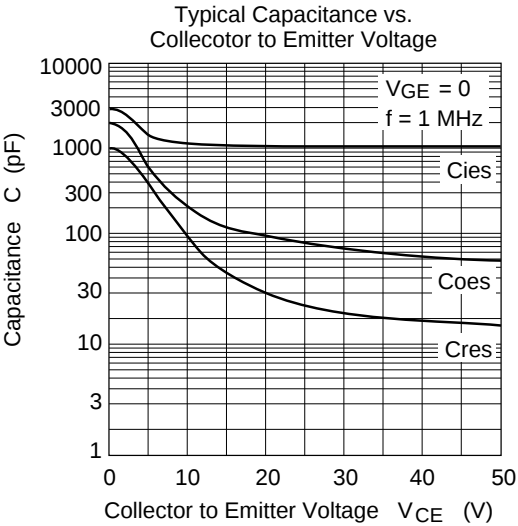
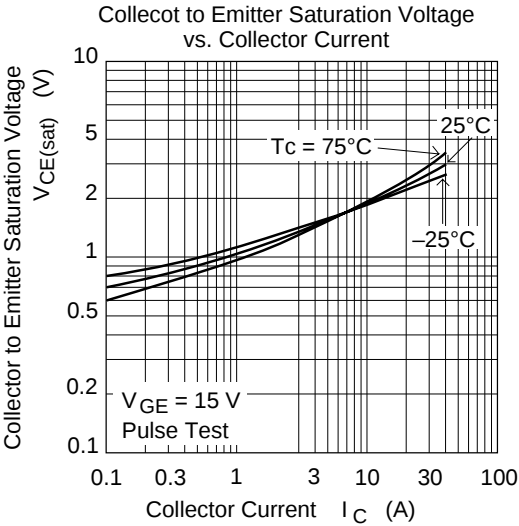
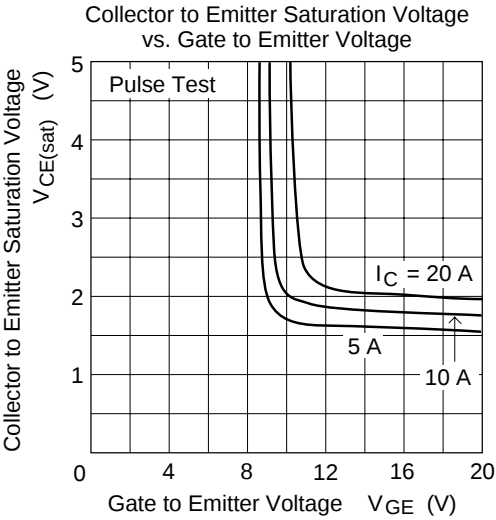
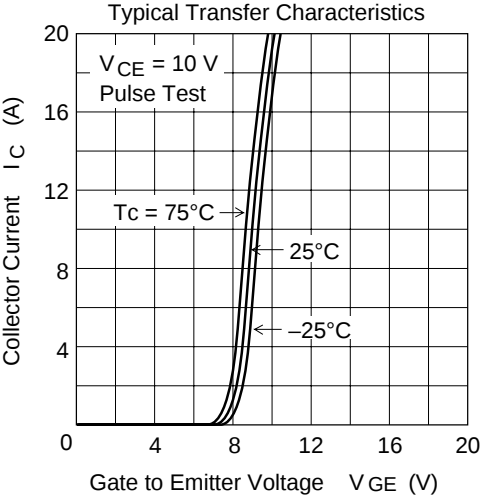


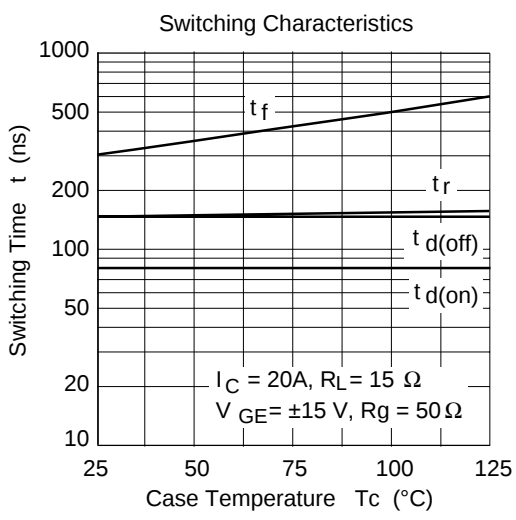
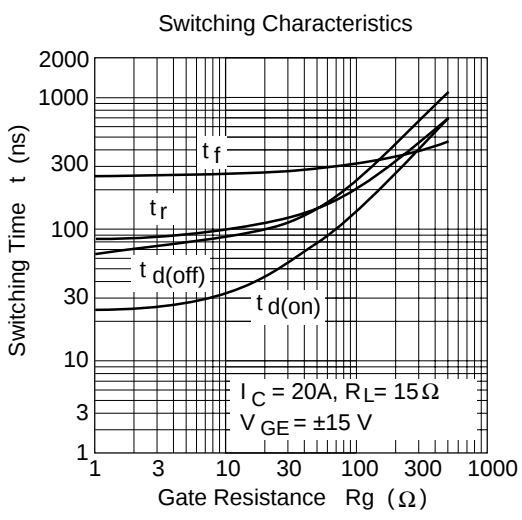
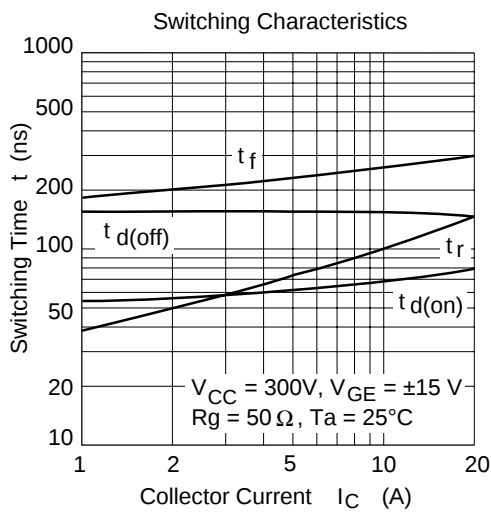
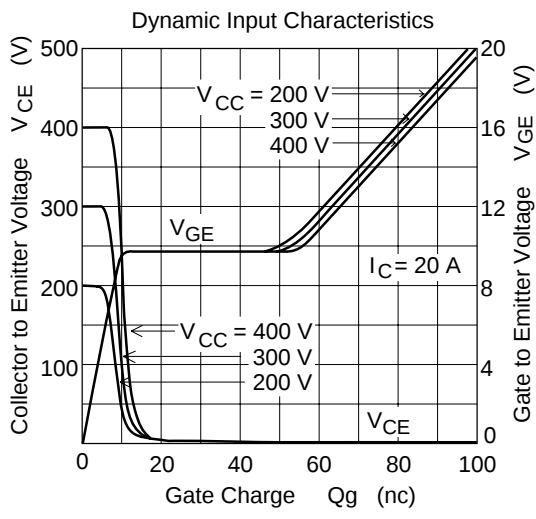
Reverse Bias SOA



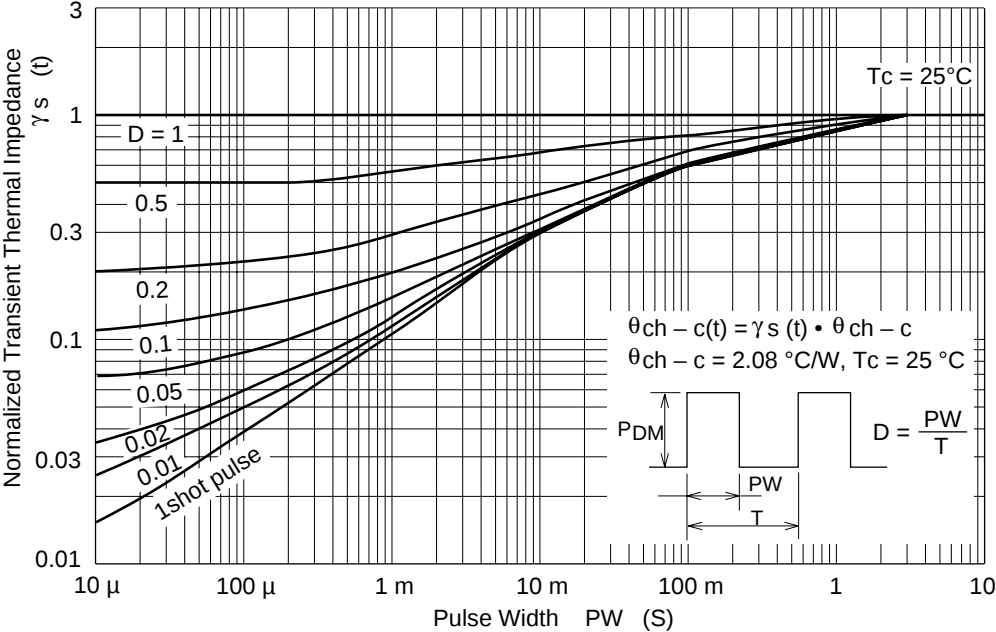
Typical Output Characteristics



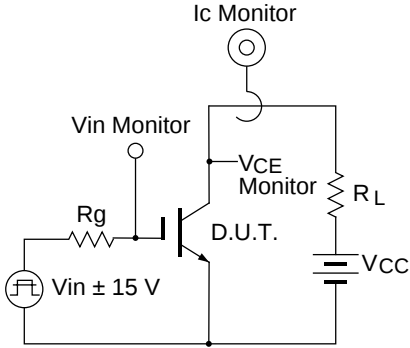




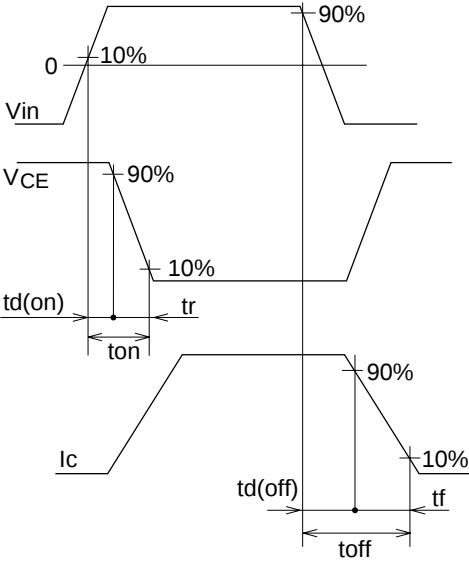
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

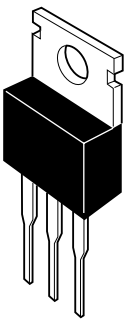
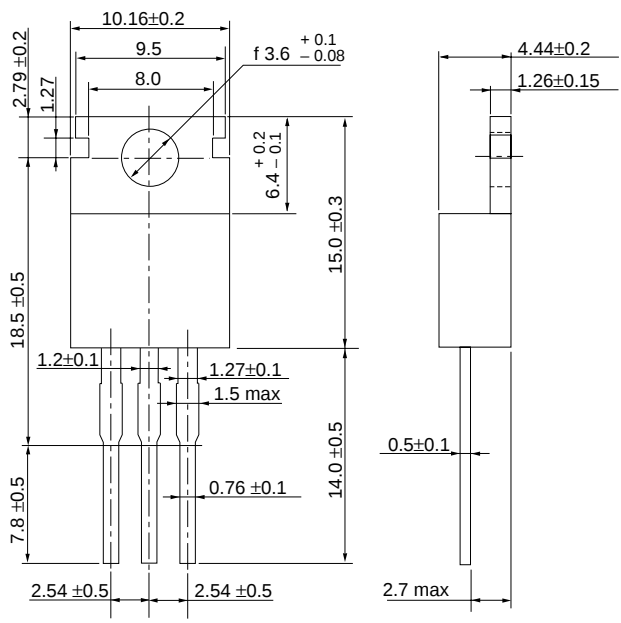


Waveform



Package Dimensions

Unit: mm



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

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