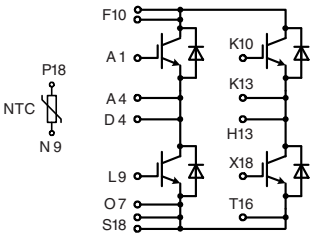
# IGBT Modules in ECO-PAC 2

## H-Bridge configuration

Short Circuit SOA Capability
Square RBSOA

$I_{C25}$ = 69 A
$V_{CES}$ = 600 V
$V_{CE(sat)\,typ.}$ = 2.3 V




Pin arangement see outlines

### IGBTs

| Symbol | Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_{VJ}$ = 25°C to 150°C | 600 | V |
| $V_{GES}$ | | ± 20 | V |
| $I_{C25}$ | $T_C$ = 25°C | 69 | A |
| $I_{C80}$ | $T_C$ = 80°C | 48 | A |
| $I_{CM}$ | $V_{GE}$ = ±15 V; $R_G$ = 22 Ω; $T_{VJ}$ = 125°C | 100 | A |
| $V_{CEK}$ | RBSOA, Clamped inductive load; L = 100 µH | $V_{CES}$ | |
| $t_{SC}$ (SCSOA) | $V_{CE}$ = $V_{CES}$; $V_{GE}$ = ±15 V; $R_G$ = 22 Ω; $T_{VJ}$ = 125°C non-repetitive | 10 | µs |
| $P_{tot}$ | $T_C$ = 25°C | 208 | W |

| Symbol | Conditions | Characteristic Values ($T_{VJ}$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $V_{CE(sat)}$ | $I_C$ = 75 A; $V_{GE}$ = 15 V; $T_{VJ}$ = 25°C | | 2.3 | 2.8 | V |
| | $T_{VJ}$ = 125°C | | 2.8 | | V |
| $V_{GE(th)}$ | $I_C$ = 1 mA; $V_{GE}$ = $V_{CE}$ | 4.5 | | 6.5 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$; $V_{GE}$ = 0 V; $T_{VJ}$ = 25°C | | | 0.8 | mA |
| | $T_{VJ}$ = 125°C | | | 4.4 | mA |
| $I_{GES}$ | $V_{CE}$ = 0 V; $V_{GE}$ = ± 20 V | | | 100 | nA |
| $t_{d(on)}$ | Inductive load, $T_{VJ}$ = 125°C | | 50 | | ns |
| $t_r$ | $V_{CE}$ = 300 V; $I_C$ = 40 A | | 55 | | ns |
| $t_{d(off)}$ | $V_{GE}$ = 15/0 V; $R_G$ = 22 Ω | | 300 | | ns |
| $t_f$ | | | 30 | | ns |
| $E_{on}$ | | | 1.8 | | mJ |
| $E_{off}$ | | | 1.4 | | mJ |
| $C_{ies}$ | $V_{CE}$ = 25 V; $V_{GE}$ = 0 V; f = 1 MHz | | 2.8 | | nF |
| $R_{thJC}$ | (per IGBT) | | | 0.6 | K/W |
| $R_{thJH}$ | with heatsink compound (0.42 K/m.K; 50 µm) | | 1.2 | | K/W |

### Features

- NPT IGBT technology
- low saturation voltage
- low switching losses
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- ultra fast free wheeling diodes
- solderable pins for PCB mounting
- package with copper base plate

### Advantages

- space savings
- reduced protection circuits
- package designed for wave soldering

### Typical Applications

- motor control
  - DC motor armature winding
  - DC motor excitation winding
  - synchronous motor excitation winding
- supply of transformer primary winding
  - power supplies
  - welding
  - X-ray
  - UPS
  - battery charger

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## Reverse diodes (FRED)

| Symbol | Conditions | Maximum Ratings | |
|---|---|---|---|
| $I_{F25}$ | $T_C$ = 25°C | 56 | A |
| $I_{F80}$ | $T_C$ = 80°C | 35 | A |

| Symbol | Conditions | Characteristic Values min. | typ. | max. | |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 40 A; $T_{VJ}$ = 25°C | | 2.32 | 2.59 | V |
| | $T_{VJ}$ = 125°C | | 1.58 | | V |
| $I_{RM}$ | $I_F$ = 30 A; $di_F/dt$ = 500 A/µs; $T_{VJ}$ = 125°C | | 15 | | A |
| $t_{rr}$ | $V_R$ = 300 V; $V_{GE}$ = 0 V | 70 | | ns | |
| $R_{thJC}$ | | | | 1.3 | K/W |
| $R_{thJH}$ | with heatsink compound (0.42 K/m.K; 50 µm) | | 2.6 | | K/W |

## Temperature Sensor NTC

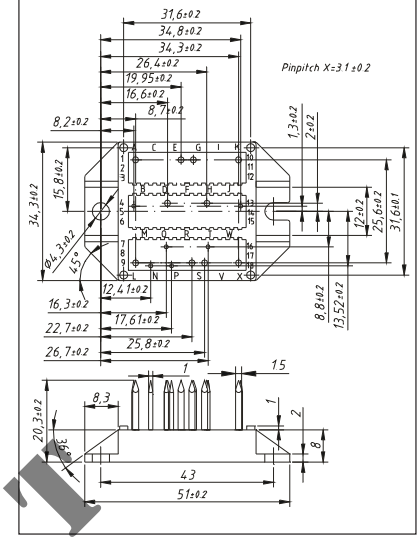
| Symbol | Conditions | Characteristic Values min. | typ. | max. | |
|---|---|---|---|---|---|
| $R_{25}$ | T = 25°C | 455 | 470 | 485 | kΩ |
| $B_{25/50}$ | | | 3474 | | K |

## Module

| Symbol | Conditions | Maximum Ratings | |
|---|---|---|---|
| $T_{VJ}$ | | -40...+150 | °C |
| $T_{stg}$ | | -40...+150 | °C |
| $V_{ISOL}$ | $I_{ISOL} \leq$ 1 mA; 50/60 Hz | 3000 | V~ |
| $M_d$ | mounting torque (M4) | 1.5 - 2.0 | Nm |
| | | 14 - 18 | lb.in. |
| a | Max. allowable acceleration | 50 | $m/s^2$ |

| Symbol | Conditions | Characteristic Values min. | typ. | max. | |
|---|---|---|---|---|---|
| $d_S$ | Creepage distance on surface (Pin to heatsink) | 11.2 | | | mm |
| $d_A$ | Strike distance in air (Pin to heatsink) | 11.2 | | | mm |
| Weight | | | 24 | | g |

Dimensions in mm (1 mm = 0.0394")

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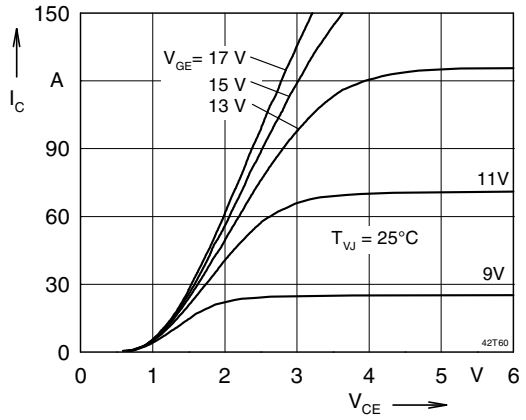


Fig. 1 Typ. output characteristics

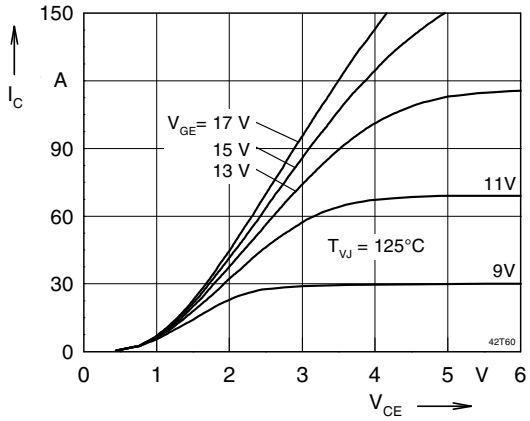


Fig. 2 Typ. output characteristics

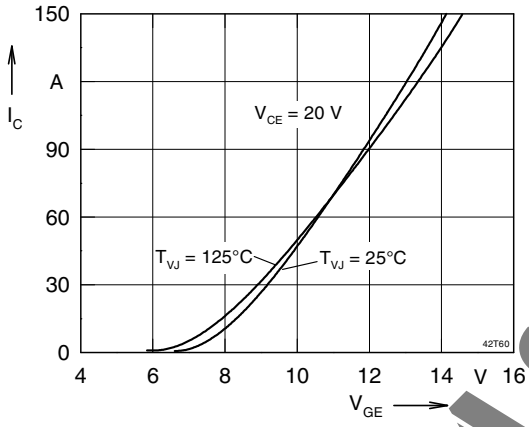


Fig. 3 Typ. transfer characteristics

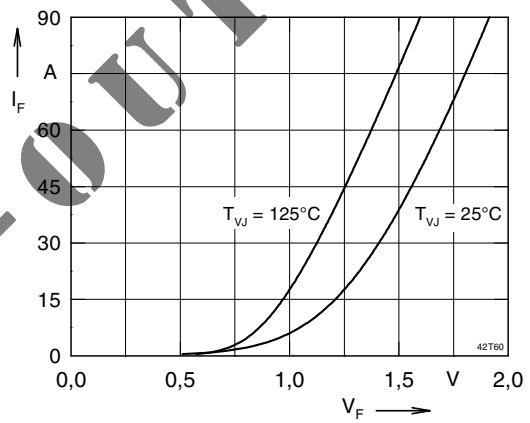


Fig. 4 Typ. forward characteristics of free wheeling diode

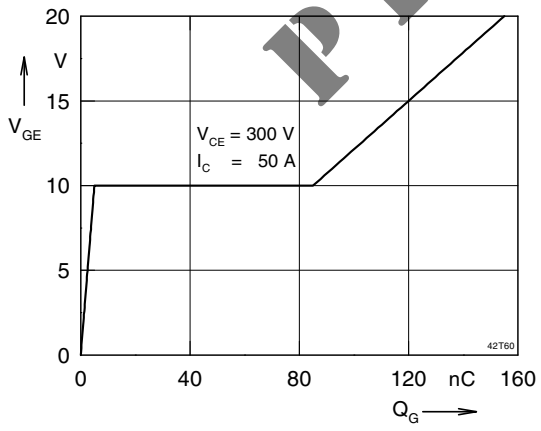


Fig. 5 Typ. turn on gate charge

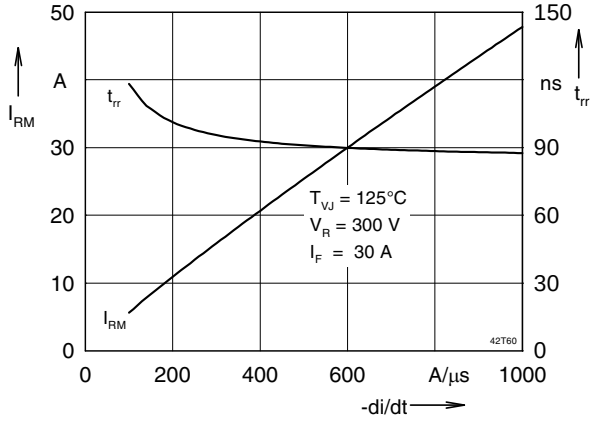


Fig. 6 Typ. turn off characteristics of free wheeling diode

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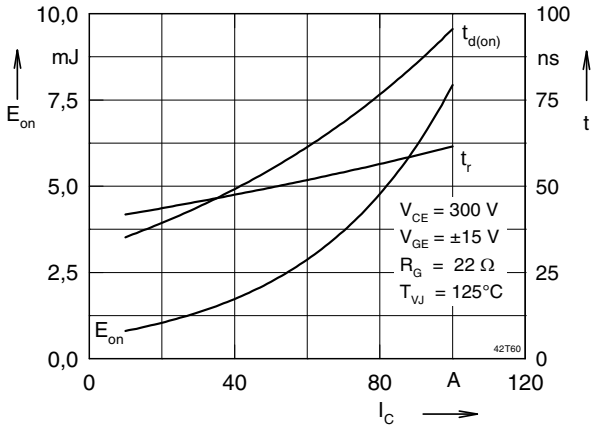


Fig. 7 Typ. turn on energy and switching

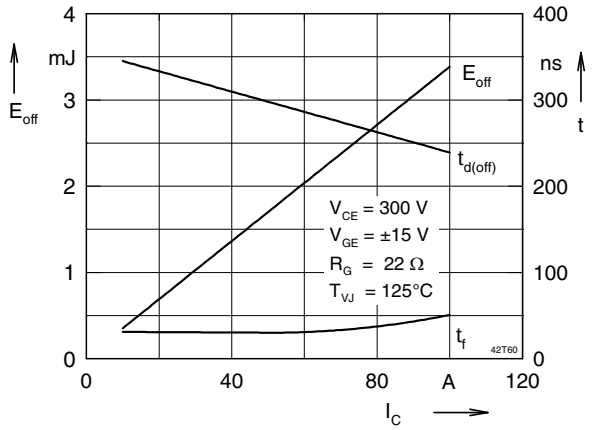


Fig. 8 Typ. turn off energy and switching times versus collector current times versus collector current

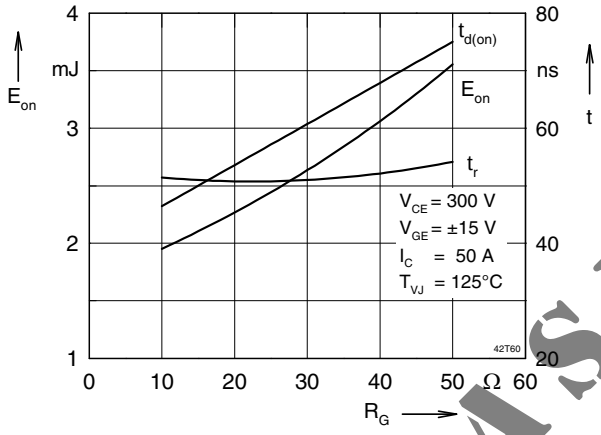


Fig. 9 Typ. turn on energy and switching

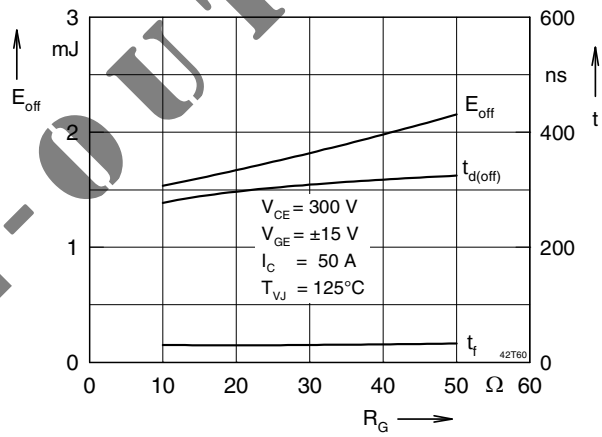


Fig. 10 Typ. turn off energy and switching times versus gate resistor times versus gate resistor

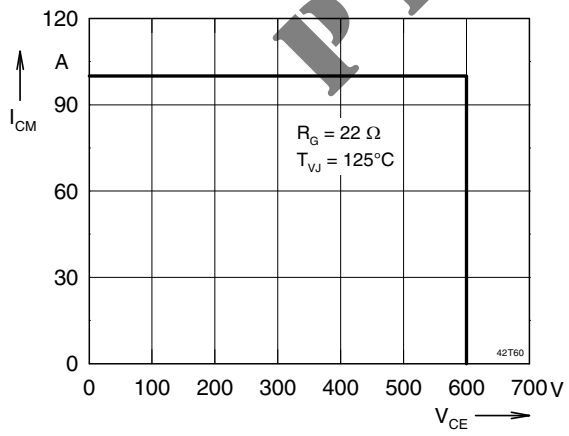


Fig. 11 Reverse biased safe operating area

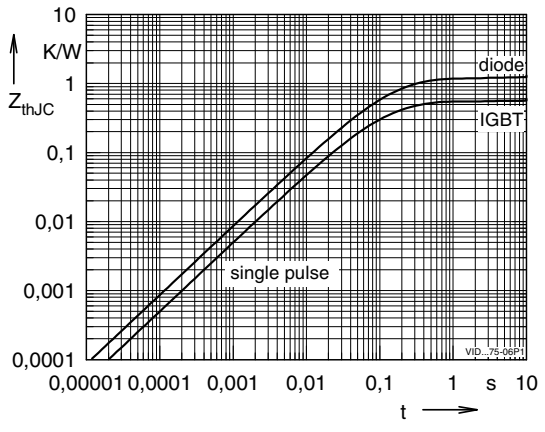


Fig. 12 Typ. transient thermal impedance RBSOA

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