Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


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International
IOR Rectifier

PD - 9.688A

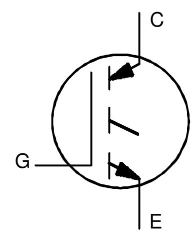
# IRGBC30S

INSULATED GATE BIPOLAR TRANSISTOR

Standard Speed IGBT

### Features

- Switching-loss rating includes all "tail" losses
- Optimized for line frequency operation ( to 400 Hz)
  See Fig. 1 for Current vs. Frequency Curve




**n-channel**

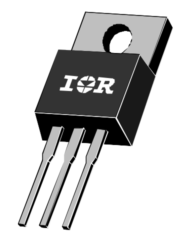
$V_{CES} = 600V$

$V_{CE(sat)} \leq 2.2V$

$@V_{GE} = 15V, I_C = 18A$

### Description

Insulated Gate Bipolar Transistors (IGBTs) from International Rectifier have higher usable current densities than comparable bipolar transistors, while at the same time having simpler gate-drive requirements of the familiar power MOSFET. They provide substantial benefits to a host of high-voltage, high-current applications.



**TO-220AB**

### Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $V_{CES}$ | Collector-to-Emitter Voltage | 600 | V |
| $I_C$ @ $T_C$ = 25°C | Continuous Collector Current | 34 | A |
| $I_C$ @ $T_C$ = 100°C | Continuous Collector Current | 18 | |
| $I_{CM}$ | Pulsed Collector Current ① | 68 | |
| $I_{LM}$ | Clamped Inductive Load Current ② | 68 | |
| $V_{GE}$ | Gate-to-Emitter Voltage | ±20 | V |
| $E_{ARV}$ | Reverse Voltage Avalanche Energy ③ | 10 | mJ |
| $P_D$ @ $T_C$ = 25°C | Maximum Power Dissipation | 100 | W |
| $P_D$ @ $T_C$ = 100°C | Maximum Power Dissipation | 42 | |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to +150 | °C |
| | Soldering Temperature, for 10 sec. | 300 (0.063 in. (1.6mm) from case) | |
| | Mounting torque, 6-32 or M3 screw. | 10 lbf•in (1.1N•m) | |

### Thermal Resistance

| | Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | — | — | 1.2 | °C/W |
| $R_{\theta CS}$ | Case-to-Sink, flat, greased surface | — | 0.50 | — | |
| $R_{\theta JA}$ | Junction-to-Ambient, typical socket mount | — | — | 80 | |
| Wt | Weight | — | 2.0 (0.07) | — | g (oz) |

Revision 0

## Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions | |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CES}$ | Collector-to-Emitter Breakdown Voltage | 600 | — | — | V | $V_{GE}$ = 0V, $I_C$ = 250µA | |
| $V_{(BR)ECS}$ | Emitter-to-Collector Breakdown Voltage ④ | 20 | — | — | V | $V_{GE}$ = 0V, $I_C$ = 1.0A | |
| $\Delta V_{(BR)CES}/\Delta T_J$ | Temperature Coeff. of Breakdown Voltage | — | 0.75 | — | V/°C | $V_{GE}$ = 0V, $I_C$ = 1.0mA | |
| $V_{CE(on)}$ | Collector-to-Emitter Saturation Voltage | — | 1.7 | 2.2 | V | $I_C$ = 18A | $V_{GE}$ = 15V |
| | | — | 2.4 | — | | $I_C$ = 34A | See Fig. 2, 5 |
| | | — | 1.9 | — | | $I_C$ = 18A, $T_J$ = 150°C | |
| $V_{GE(th)}$ | Gate Threshold Voltage | 3.0 | — | 5.5 | | $V_{CE}$ = $V_{GE}$, $I_C$ = 250µA | |
| $\Delta V_{GE(th)}/\Delta T_J$ | Temperature Coeff. of Threshold Voltage | — | -11 | — | mV/°C | $V_{CE}$ = $V_{GE}$, $I_C$ = 250µA | |
| $g_{fe}$ | Forward Transconductance ⑤ | 6.0 | 11 | — | S | $V_{CE}$ = 100V, $I_C$ = 18A | |
| $I_{CES}$ | Zero Gate Voltage Collector Current | — | — | 250 | µA | $V_{GE}$ = 0V, $V_{CE}$ = 600V | |
| | | — | — | 1000 | | $V_{GE}$ = 0V, $V_{CE}$ = 600V, $T_J$ = 150°C | |
| $I_{GES}$ | Gate-to-Emitter Leakage Current | — | — | ±100 | nA | $V_{GE}$ = ±20V | |

## Switching Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge (turn-on) | — | 28 | 40 | nC | $I_C$ = 18A |
| $Q_{ge}$ | Gate - Emitter Charge (turn-on) | — | 5.0 | 8.0 | | $V_{CC}$ = 400V See Fig. 8 |
| $Q_{gc}$ | Gate - Collector Charge (turn-on) | — | 12 | 20 | | $V_{GE}$ = 15V |
| $t_{d(on)}$ | Turn-On Delay Time | — | 26 | — | ns | $T_J$ = 25°C |
| $t_r$ | Rise Time | — | 32 | — | | $I_C$ = 18A, $V_{CC}$ = 480V |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 820 | 1100 | | $V_{GE}$ = 15V, $R_G$ = 23Ω |
| $t_f$ | Fall Time | — | 720 | 1200 | | Energy losses include "tail" |
| $E_{on}$ | Turn-On Switching Loss | — | 0.51 | — | mJ | |
| $E_{off}$ | Turn-Off Switching Loss | — | 6.6 | — | | See Fig. 9, 10, 11, 14 |
| $E_{ts}$ | Total Switching Loss | — | 7.1 | 10 | | |
| $t_{d(on)}$ | Turn-On Delay Time | — | 26 | — | ns | $T_J$ = 150°C, |
| $t_r$ | Rise Time | — | 35 | — | | $I_C$ = 18A, $V_{CC}$ = 480V |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 1200 | — | | $V_{GE}$ = 15V, $R_G$ = 23Ω |
| $t_f$ | Fall Time | — | 1500 | — | | Energy losses include "tail" |
| $E_{ts}$ | Total Switching Loss | — | 12 | — | mJ | See Fig. 10, 14 |
| $L_E$ | Internal Emitter Inductance | — | 7.5 | — | nH | Measured 5mm from package |
| $C_{ies}$ | Input Capacitance | — | 700 | — | pF | $V_{GE}$ = 0V |
| $C_{oes}$ | Output Capacitance | — | 70 | — | | $V_{CC}$ = 30V See Fig. 7 |
| $C_{res}$ | Reverse Transfer Capacitance | — | 9.2 | — | | $f$ = 1.0MHz |

**Notes:**

① Repetitive rating; $V_{GE}$=20V, pulse width limited by max. junction temperature. ( See fig. 13b )

② $V_{CC}$=80%($V_{CES}$), $V_{GE}$=20V, L=10µH, $R_G$= 23Ω, ( See fig. 13a )

③ Repetitive rating; pulse width limited by maximum junction temperature.

④ Pulse width ≤ 80µs; duty factor ≤ 0.1%.

⑤ Pulse width 5.0µs, single shot.

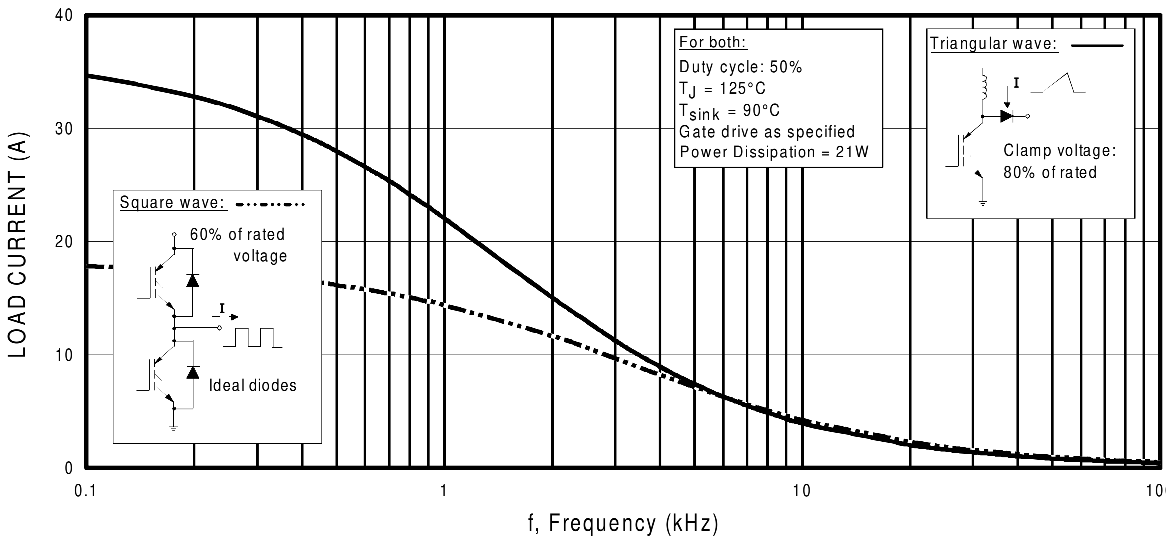



**Fig. 1** - Typical Load Current vs. Frequency
(For square wave, $I=I_{RMS}$ of fundamental; for triangular wave, $I=I_{PK}$)

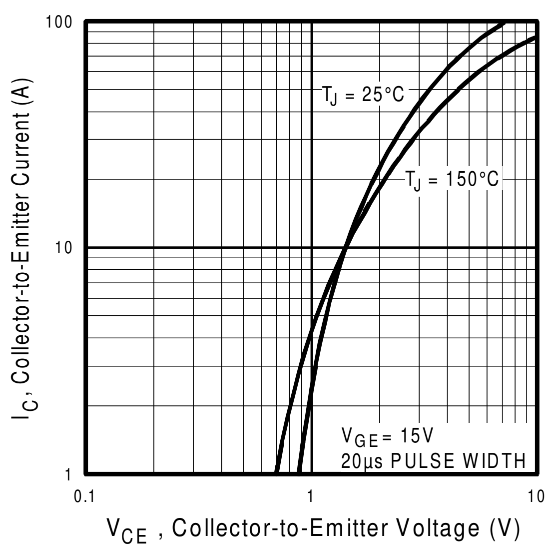



**Fig. 2** - Typical Output Characteristics

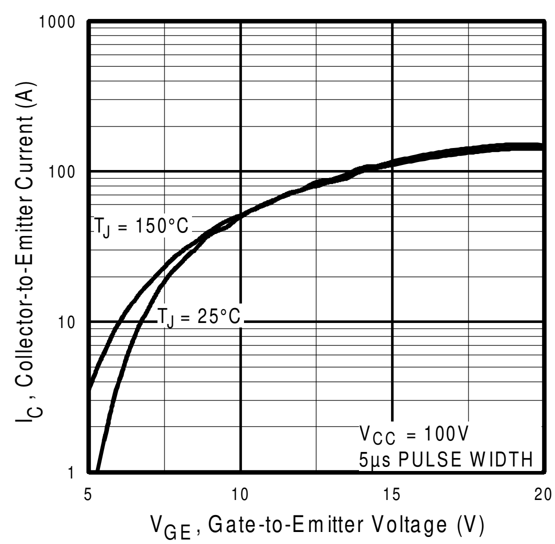



**Fig. 3** - Typical Transfer Characteristics

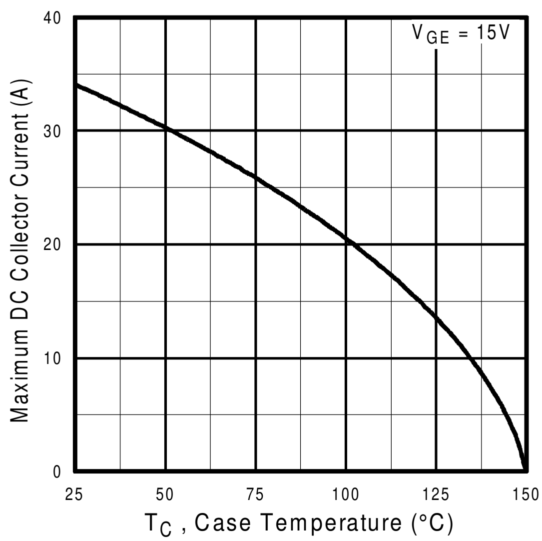



**Fig. 4** - Maximum Collector Current vs. Case Temperature

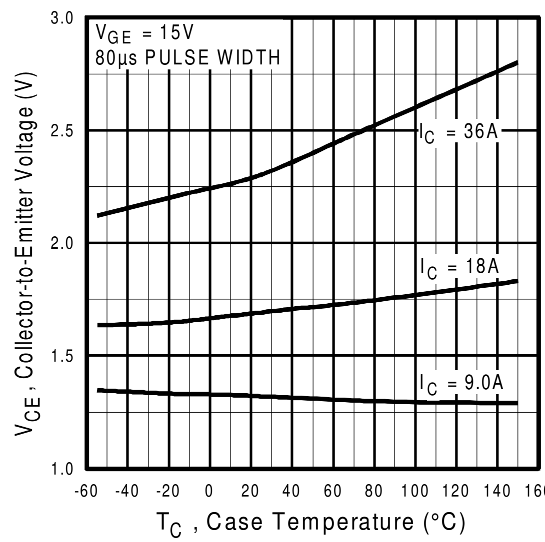



**Fig. 5** - Collector-to-Emitter Voltage vs. Case Temperature

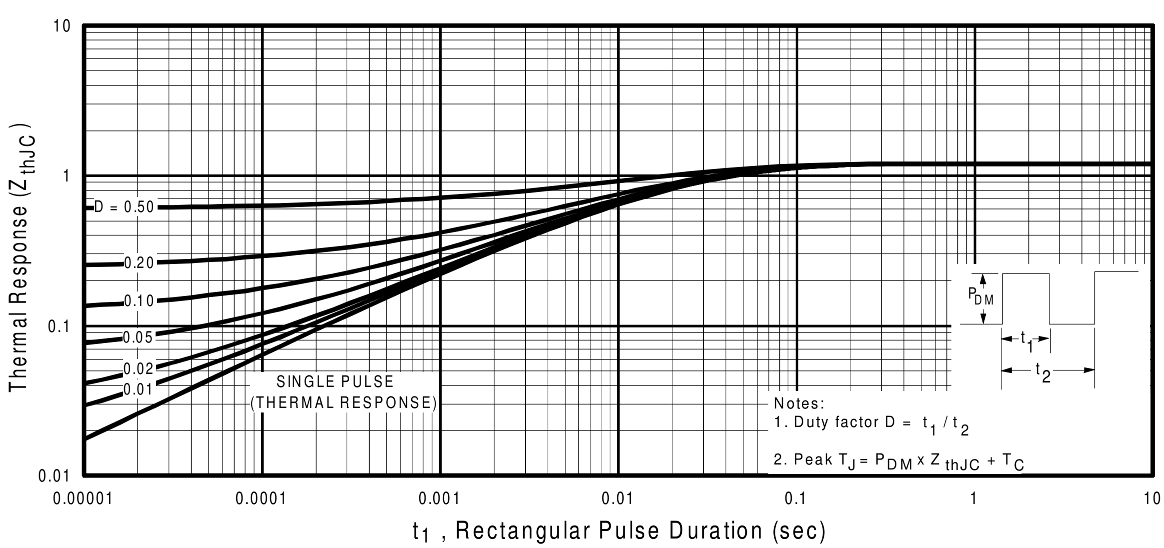



**Fig. 6** - Maximum Effective Transient Thermal Impedance, Junction-to-Case

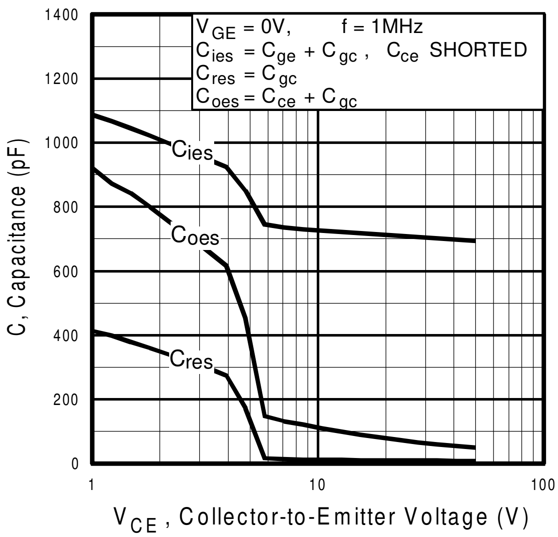



**Fig. 7 -** Typical Capacitance vs. Collector-to-Emitter Voltage

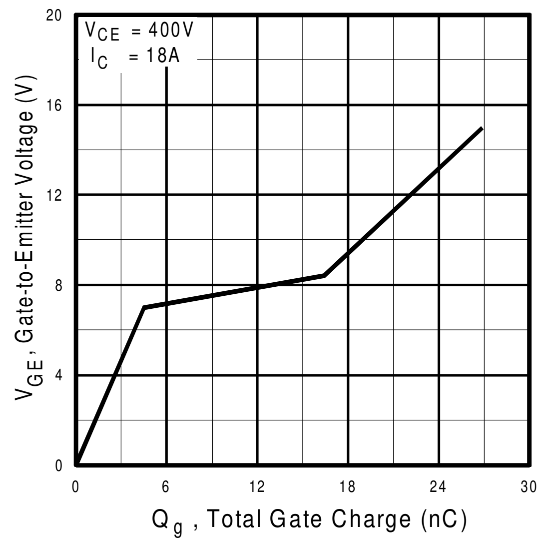



**Fig. 8** - Typical Gate Charge vs. Gate-to-Emitter Voltage

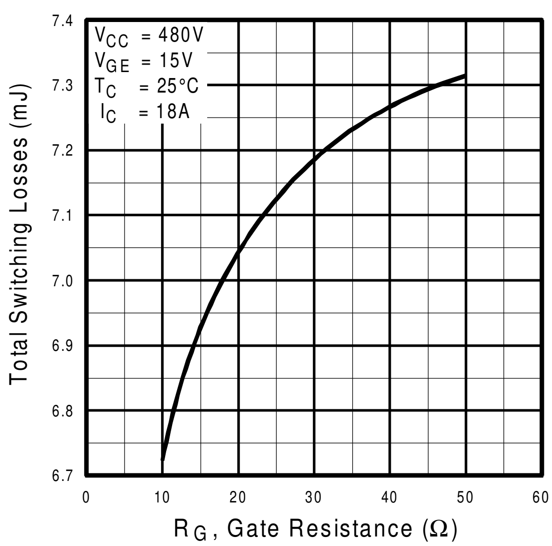



**Fig. 9** - Typical Switching Losses vs. Gate Resistance

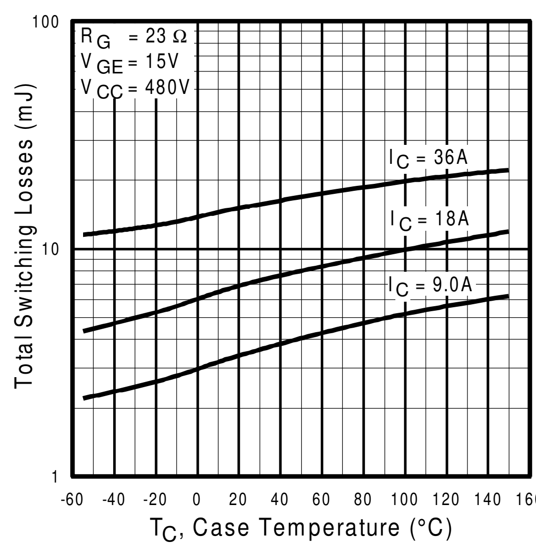



**Fig. 10** - Typical Switching Losses vs. Case Temperature

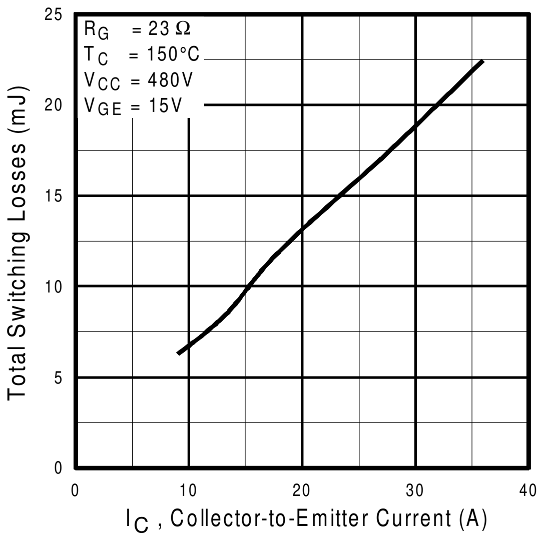



**Fig. 11 -** Typical Switching Losses vs. Collector-to-Emitter Current

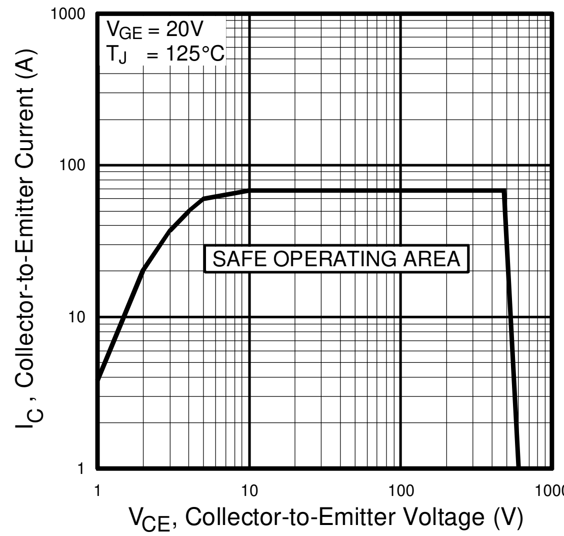



**Fig. 12** - Turn-Off SOA

**Refer to Section D for the following:**

**Appendix C: Section D - page D-5**

Fig. 13a - Clamped Inductive Load Test Circuit
Fig. 13b - Pulsed Collector Current Test Circuit
Fig. 14a - Switching Loss Test Circuit
Fig. 14b - Switching Loss Waveform

**Package Outline 1** - JEDEC Outline TO-220AB **Section D - page D-12**