JJMICROELECTRONICS

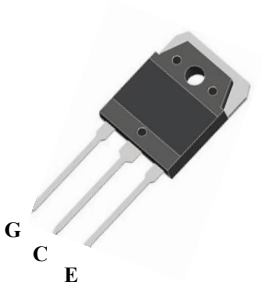
# 1350V 30A Trench and Field Stop IGBT

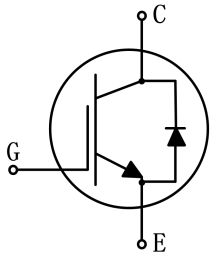
**JJT30N135UH**

## Key performance:

- $V_{CE}$=1350V
- $I_C$=30A@$T_C$=100℃
- $V_{CE(sat)}$=2.1V

TO-3P




## Features:

- Trench and field-stop technology
- High speed switching
- Positive VCE (sat) temperature coefficient.
- Fast switching and short tail current.
- High ruggedness performance

## Applications:

- Induction cooking
- Resonant converters

## Package parameters

| Type | Marking | Package | Packaging Method |
|---|---|---|---|
| JJT30N135UH | T30135UH | TO-3P | Tube |

## Maximum ratings

| Symbol | Parameter | Values | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage | 1350 | V |
| $V_{GES}$ | Gate-emitter voltage | ±20 | V |
| $I_C$ | Continuous collector current ($T_C$=25℃) | 60 | A |
| | Continuous collector current ($T_C$=100℃) | 30 | A |
| $I_{CM}$ | Pulsed collector current, $t_p$ limited by $T_{vjmax}$ | 120 | A |
| $I_F$ | Diode continuous forward current ($T_C$=100℃) | 30 | A |
| $I_{FM}$ | Diode maximum current, $t_p$ limited by $T_{vjmax}$ | 120 | A |
| $P_{tot}$ | Power dissipation ($T_C$=25℃) | 416 | W |
| | Power dissipation ($T_C$=100℃) | 208 | W |
| $T_{vj}$ | Operating junction temperature range | -40 to +175 | ℃ |
| $T_{stg}$ | Storage temperature range | -55 to +150 | ℃ |

## Thermal characteristics

| Symbol | Parameter | Values | | Unit |
|---|---|---|---|---|
| | | Typ. | Max. | |
| $R_{th(j-c)}$ | Thermal resistance, junction to case for IGBT | - | 0.36 | K/ W |
| $R_{th(j-c)}$ | Thermal resistance, junction to case for Diode | - | 1.40 | K/ W |
| $R_{th(j-a)}$ | Thermal resistance, junction to ambient | - | 40 | K/ W |

## Electrical characteristics of IGBT ($T_{vj}$=25℃ unless otherwise specified)

### Static characteristics

| Symbol | Parameter | Test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $BV_{CES}$ | Collector-emitter breakdown voltage | $V_{GE}$=0V, $I_C$=250μA | 1350 | - | - | V |
| $I_{CES}$ | Collector-emitter leakage current | $V_{CE}$=1350V, $V_{GE}$=0V | - | - | 100 | μA |
| $I_{GES}$ | Gate leakage current, forward | $V_{GE}$=20V, $V_{CE}$=0V | - | - | 100 | nA |
| | Gate leakage current, reverse | $V_{GE}$=-20V, $V_{CE}$=0V | - | - | -100 | nA |
| $V_{GE(th)}$ | Gate-emitter threshold voltage | $V_{GE}$=$V_{CE}$, $I_C$=1mA | 5.0 | 5.4 | 6.0 | V |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $V_{GE}$=15 V, $I_C$=30A | - | 2.1 | - | V |
| | | $V_{GE}$=15V, $I_C$=30A, $T_{vj}$=175℃ | - | 2.8 | - | V |

### Dynamic characteristics

| Symbol | Parameter | Test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $C_{ies}$ | Input capacitance | $V_{CE}$=30V<br>$V_{GE}$=0V<br>$f$=1MHz | - | 4530 | - | pF |
| $C_{oes}$ | Output capacitance | | - | 54 | - | pF |
| $C_{res}$ | Reverse transfer capacitance | | - | 25 | - | pF |
| $Q_g$ | Total gate charge | $V_{CC}$=1080V<br>$V_{GE}$=15V<br>$I_C$=30A | - | 149 | - | nC |

## Switching characteristics

| Symbol | Parameter | Test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $t_{d(off)}$ | Turn-off delay time | $V_{CC}$=600V<br>$V_{GE}$=0/15V<br>$I_C$=30A<br>$R_G$=10Ω<br>Inductive load | - | 176 | - | ns |
| $t_f$ | Fall time | | - | 132 | - | ns |
| $E_{off}$ | Turn-off energy | | - | 1.3 | - | mJ |
| $t_{d(off)}$ | Turn-off delay time | $V_{CC}$=600V<br>$V_{GE}$=0/15V<br>$I_C$=30A<br>$R_G$=10Ω, $T_{vj}$=175℃<br>Inductive load | - | 201 | - | ns |
| $t_f$ | Fall time | | - | 229 | - | ns |
| $E_{off}$ | Turn-off energy | | - | 1.7 | - | mJ |

## Electrical characteristics of Diode ($T_{vj}$=25℃ unless otherwise specified)

| Symbol | Parameter | Test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $V_F$ | Diode forward voltage | $I_F$=30A | - | 2.8 | - | V |
| | | $I_F$=30A,$T_{vj}$=175℃ | - | 2.7 | - | V |

## Typical performance characteristics

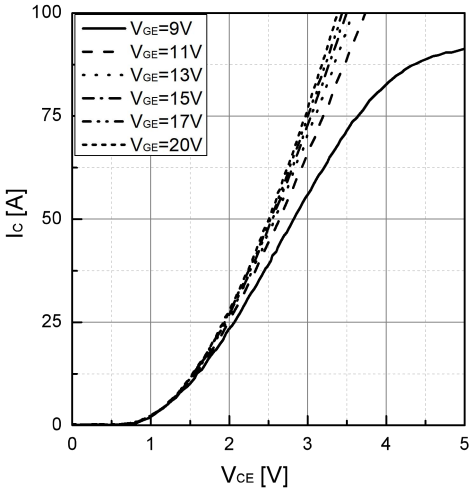



Fig 1. Typical output characteristic ($T_{vj}$=25℃)

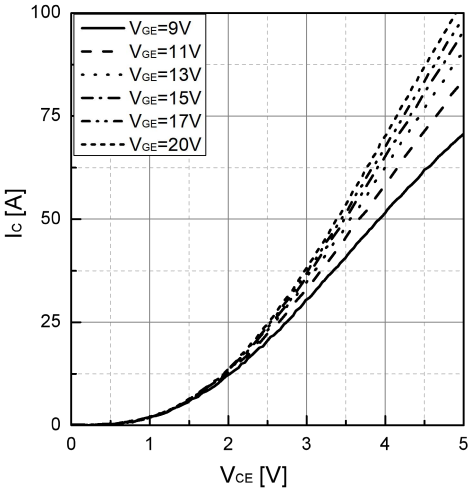



Fig 2. Typical output characteristic($T_{vj}$=175℃)

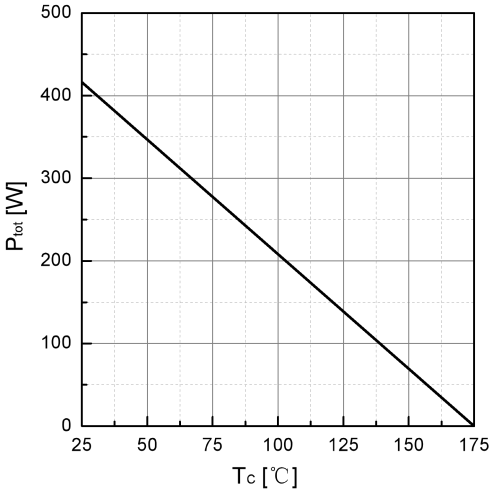



Fig 3. Power dissipation as a function of $T_C$

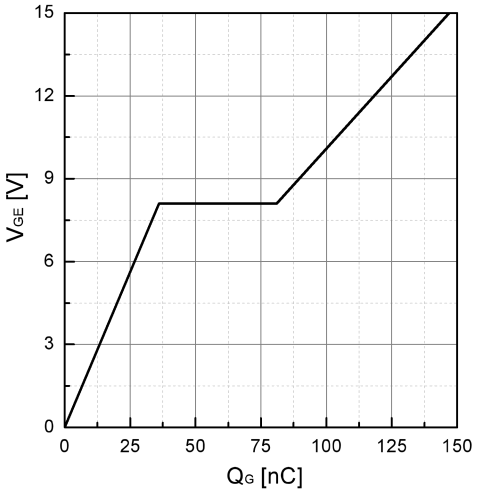



Fig 4. Typical Gate charge

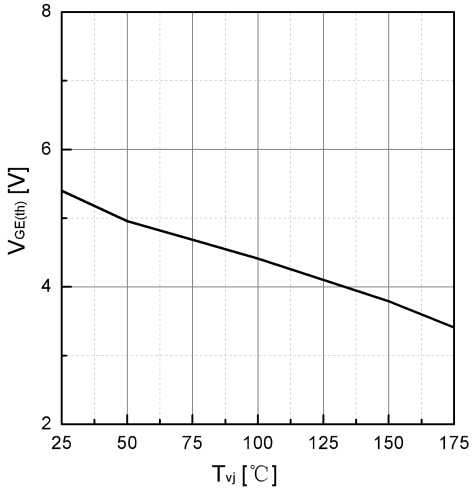



Fig 5. Typical $V_{GE(th)}$ as a function of $T_{vj}$ ($I_C$=1mA)

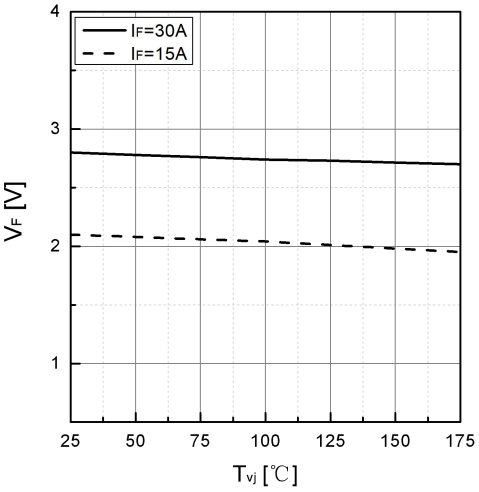



Fig 6. Typical $V_F$ as a function of $T_{vj}$

## Typical performance characteristics

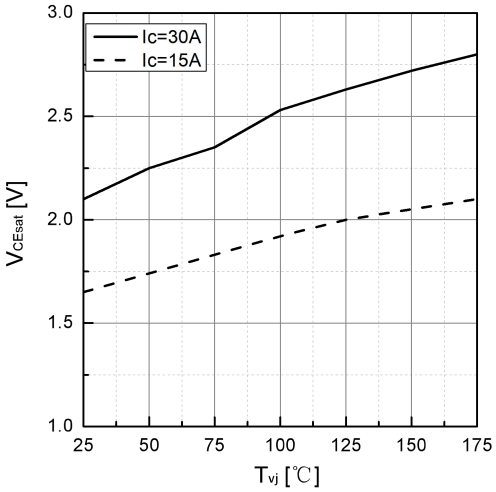



Fig 7. Typical $V_{CEsat}$ as a function of $T_{vj}$

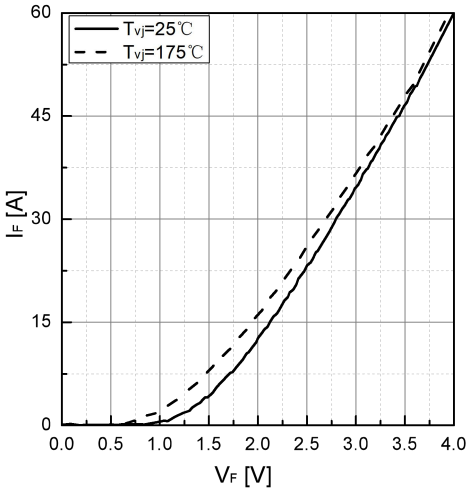



Fig 8. Typical $I_F$ as a function of $V_F$

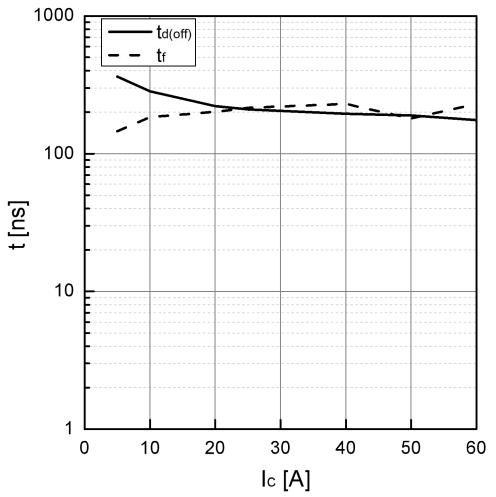



Fig 9. Typical switching time as a function of $I_C$

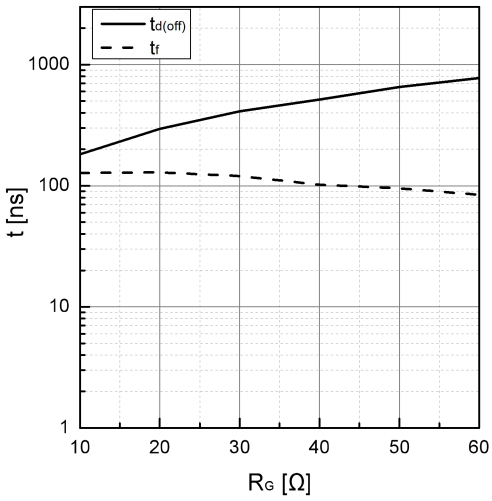



Fig 10. Typical switching times as a function of $R_G$

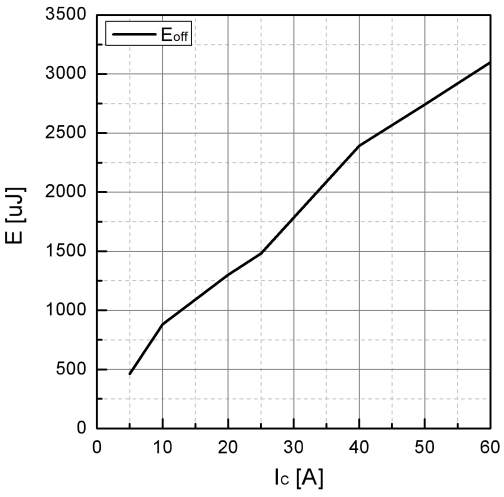



Fig 11. Typical switching energy losses as a function of $I_C$

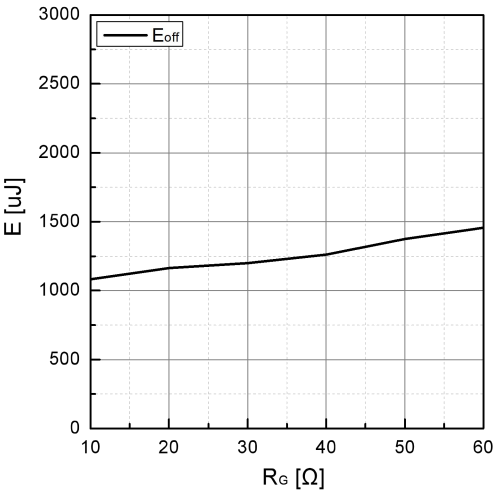



Fig 12. Typical switching energy losses as a function of $R_G$

## Typical performance characteristics

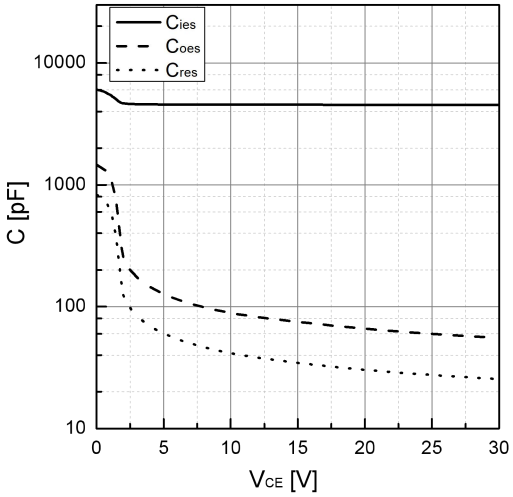



Fig 13. Typical capacitance as a function of $V_{CE}$ (f=1Mhz, $V_{GE}$=0V)

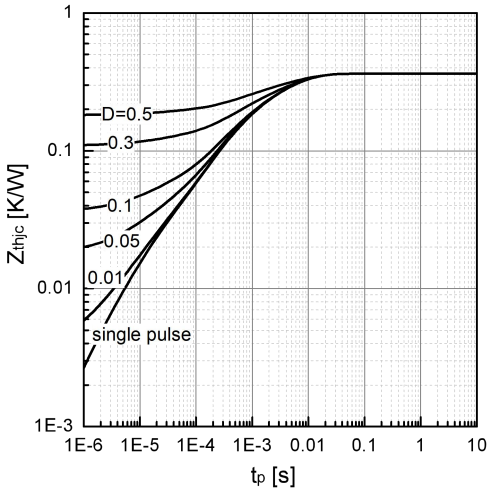
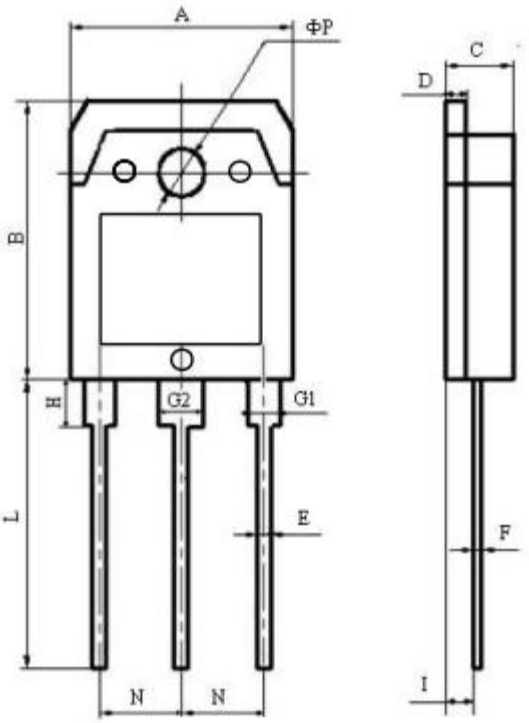



Fig 14. Transient thermal impedance of IGBT

## Package dimension

TO-3P




| Items | Values(mm) | |
|---|---|---|
| | MIN | MAX |
| A | 15.00 | 16.00 |
| B | 19.20 | 20.60 |
| C | 4.60 | 5.00 |
| D | 1.40 | 1.60 |
| E | 0.90 | 1.10 |
| F | 0.50 | 0.70 |
| G1 | 2.00 | 2.20 |
| G2 | 3.00 | 3.20 |
| H | 3.00 | 3.70 |
| I | 2.30 | 2.50 |
| L* | 19.00 | 21.00 |
| N | 5.25 | 5.65 |
| ϕ P | 3.10 | 3.30 |

## Revision history

| Date | Revision | Changes |
|---|---|---|
| 2025-04-22 | Rev 1.0 | Release of the datasheet |
| | | |
| | | |

## Disclaimer

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