

AOT15B65M1-VB Datasheet

600V Trench and Fieldstop IGBT

| PRODUCT SUMMARY | | |
|--------------------------|----------------------------|-----------------------------|
| V _{CE} (V) | 600 | |
| I _C (A) | 30 (T _C =25 °C) | 15 (T _C =100 °C) |
| V _{CE(sat)} (V) | 1.6 | |
| Q _g (nC) | 65 | |
| I _{CM} (A) | 45 | |

FEATURES

- Very Low V_{CEsat}
- Low turn-off losses
- High speed switching
- Maximum junction temperature 175°C
- Ultra low gate charge (Q_g)
- Avalanche energy rated (UIS)



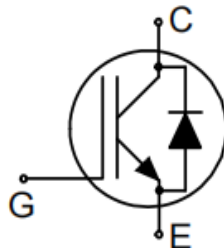
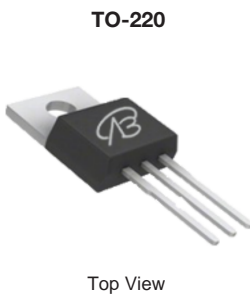
RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Telecommunications
 - Server and telecom power supplies
- Lighting
 - High-intensity discharge (HID)
 - Fluorescent ballast lighting
- Consumer and computing
 - ATX power supplies
- Industrial
 - Welding
 - Battery chargers
- Renewable energy
 - Solar (PV inverters)
- Switch mode power supplies (SMPS)

Package pin definition

- Pin1 G - Gate
- Pin2 C & backside - Collector
- Pin3 E - Emitter



| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | | |
|---------------------------------------------------------------------------|---------------------------------------------|-----------------------------------|-------------------------|------|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Collector-Emitter Voltage | | V _{CE} | 600 | V |
| Gate-Emitter Voltage | | V _{GE} | ±30 | |
| Continuous Collector Current (T _J = 150 °C) | V _{GE} at 15 V | I _C | T _C = 25 °C | 30 |
| | | | T _C = 100 °C | 15 |
| Pulsed Collector Current ^a | | I _{CM} | 45 | A |
| Diode Forward Current ^b | | I _F | 60 | A |
| Maximum Power Dissipation | | P _D | T _C = 25 °C | 170 |
| | | | T _C = 100 °C | 31 |
| Operating Junction and Storage Temperature Range | | T _J , T _{stg} | -55 to +175 | °C |
| Short Circuit Withstand Time ^{TC=150} | V _{GE} = 15V, V _{CE} 400V | t _{sc} | 3 | µs |
| Short Circuit Withstand Time ^{TC=100} | V _{GE} = 15V, V _{CE} 330V | | 5 | |
| Soldering Recommendations (Peak Temperature) ^c | for 10 s | | 260 | °C |

Notes

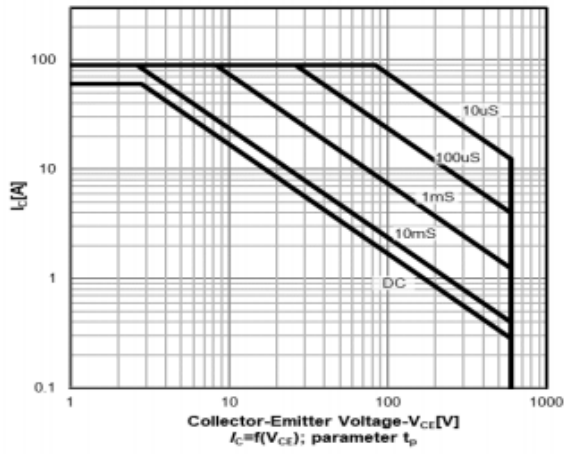
- Repetitive rating; pulse width limited by maximum junction temperature.
- Current limited by maximum junction temperature.
- 1.6 mm from case.

| THERMAL RESISTANCE RATINGS | | | | |
|-----------------------------|------------|------|------|------|
| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
| Maximum Junction-to-Ambient | R_{thJA} | 40 | 80 | °C/W |
| Maximum Junction-to-Case | R_{thJC} | 0.88 | 4.8 | |

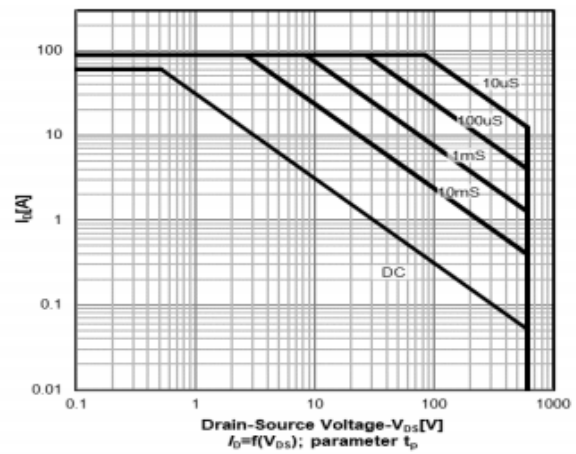
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | | |
|-----------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------|--------|--------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | | |
| Collector-Emitter Breakdown Voltage | BV_{CE} | $V_{GE} = 0\text{ V}, I_C = 250\text{ }\mu\text{A}$ $V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$ | | 600 600 | - - | - - | V |
| Gate-Source Threshold Voltage (N) | $V_{GE(th)}$ | $V_{CE} = V_{GE}, I_D = 250\text{ }\mu\text{A}$ | | 4 | 5 | 6 | V |
| Zero Gate Voltage Collector Current | I_{CES} | $V_{CE} = 480\text{ V}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$ | | - | 1 | 20 | μA |
| | | $V_{CE} = 480\text{ V}, V_{GE} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$ | | - | 1000 | - | μA |
| Gate-Emitter Leakage Current | I_{GES} | $V_{CE} = 0\text{ V}, V_{GS} = \pm 2.0\text{ V}$ | | - | - | 100 | nA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE} = 15\text{ V}$ | $I_C = 30\text{ A}$ | - | 1.6 | 2.1 | V |
| Forward Transconductance | g_{fs} | $V_{CE} = 20\text{ V}, I_C = 30\text{ A}$ | | - | 16 | - | S |
| Dynamic | | | | | | | |
| Input Capacitance | C_{ies} | $V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V},$ $f = 500\text{ KHz}$ | | - | 1800 | - | pF |
| Output Capacitance | C_{oes} | | | - | 82 | - | |
| Reverse Transfer Capacitance | C_{res} | | | - | 12 | - | |
| Turn-on Energy | E_{on} | $V_{CS} = 400\text{ V}, V_{GE} = 0/15\text{ V},$ $I_C = 30\text{ A}, R_g = 10\text{ }\Omega$ | | - | 0.62 | - | ns |
| Turn-off Energy | E_{off} | | | - | 0.31 | - | |
| Total Gate Charge | Q_g | $V_{GE} = 15\text{ V}$ | $I_C = 30\text{ A}, V_{CE} = 400\text{ V}$ | - | 65 | - | nC |
| Gate-Emitter Charge | Q_{ge} | | | - | 14 | - | |
| Gate to Collector Charge | Q_{gc} | | | - | 13 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CS} = 400\text{ V}, V_{GE} = 0/15\text{ V},$ $I_C = 30\text{ A}, R_g = 10\text{ }\Omega$ | | - | 60 | - | ns |
| Rise Time | t_r | | | - | 43 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | - | 184 | - | |
| Fall Time | t_f | | | - | 30 | - | |
| Internal emitter inductance measured 5 mm | L_E | | | - | 13 | - | |
| Diode Characteristics | | | | | | | |
| Diode Forward Current | I_F | IGBT symbol showing the integral reverse junction diode | | - | - | 15 | A |
| Pulsed Diode Forward Current | I_{FM} | | | - | - | 45 | |
| Diode Forward Voltage | V_F | $I_F = 30\text{ A}$ | | - | 1.35 | 2.0 | V |
| Reverse Recovery Time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}, I_F = 30\text{ A},$ $dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 400\text{ V}$ | | - | 73 | - | ns |
| Reverse Recovery Charge | Q_{rr} | | | - | 45 | - | μC |
| Reverse Recovery Current | I_{RRM} | | | - | 13 | - | A |

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

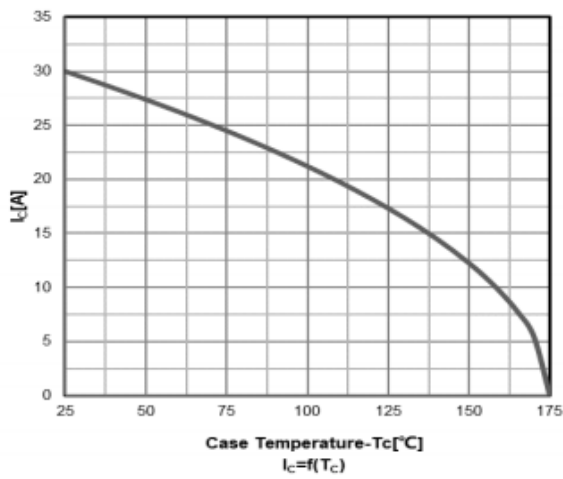
Safe operating area Ta=25 °C
Non-Full PAK



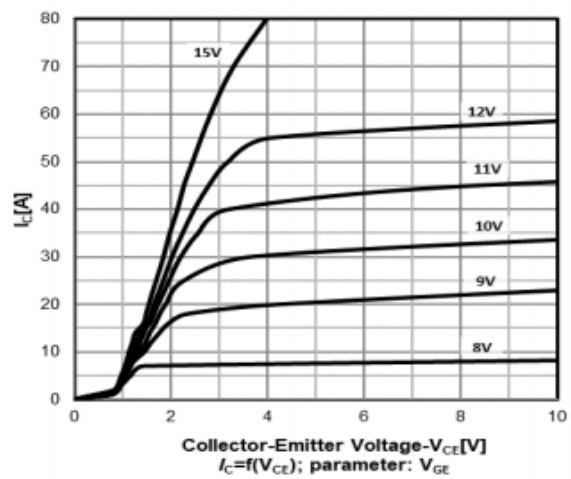
Safe operating area Ta=25 °C
Full PAK



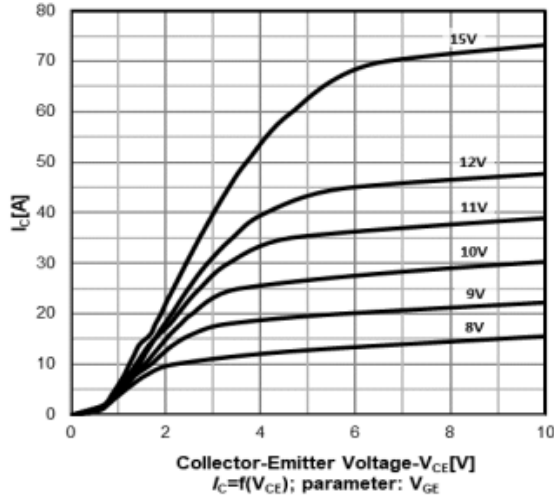
Collector current as a function of
Case temperature



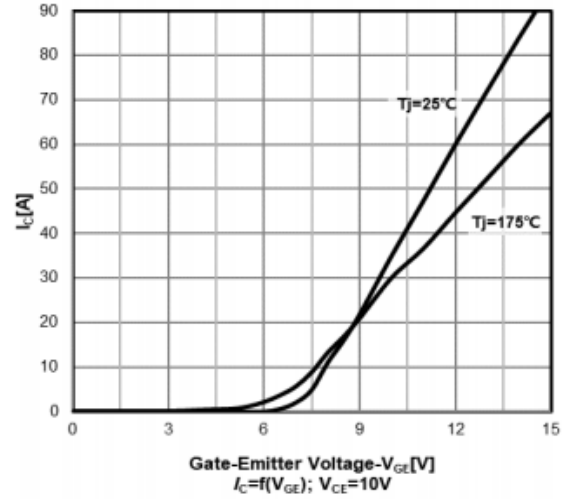
Typ. Output characteristics
 $T_J=25\text{ °C}$



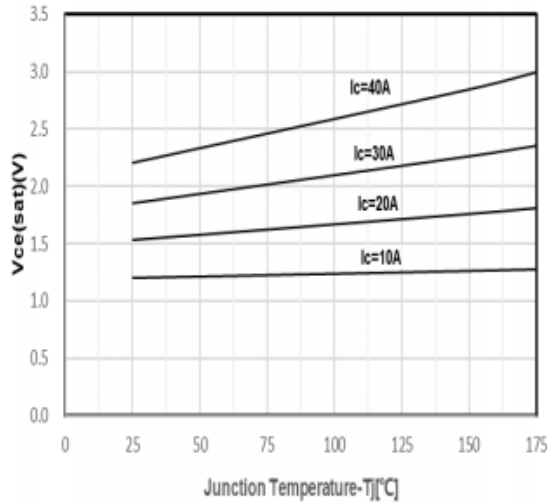
Typ. Output characteristics
 $T_j=175^\circ\text{C}$



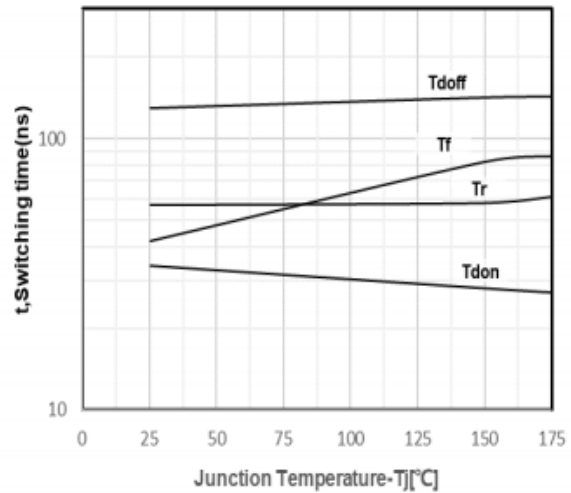
Typ. Transfer characteristics



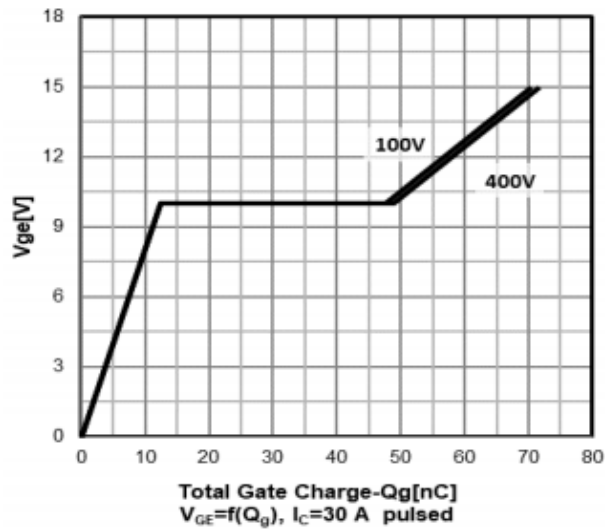
Typ. Collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)



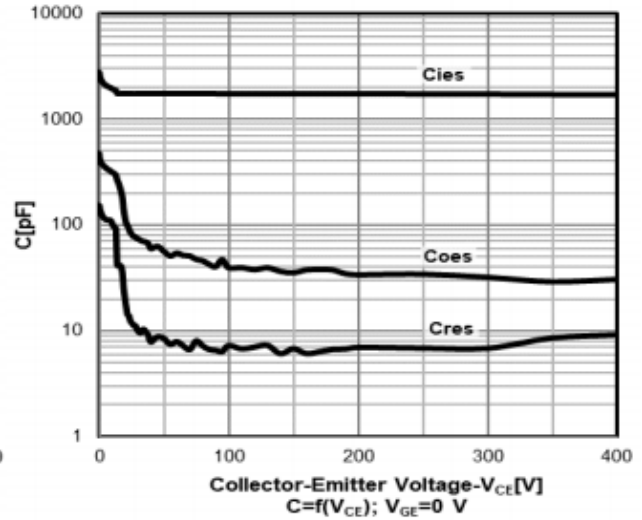
Typ. Switching times as a function of junction temperature (inductive load, $V_{CE}=400\text{V}$, $V_{GE}=0/15\text{V}$, $R_G=10\Omega$)



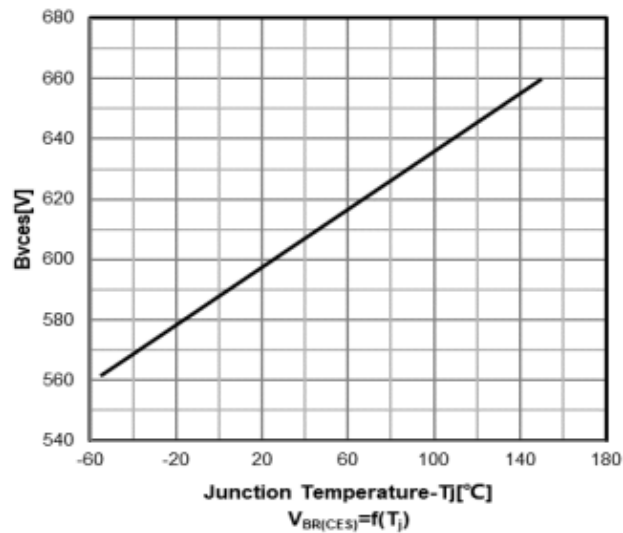
Gate charge characteristics



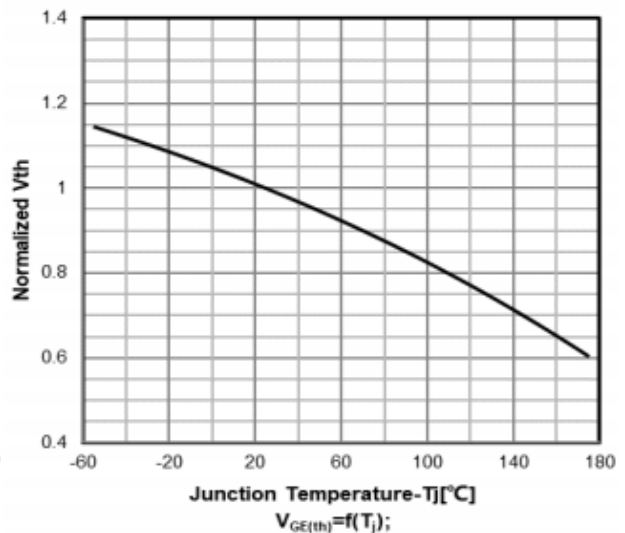
Capacitance characteristics



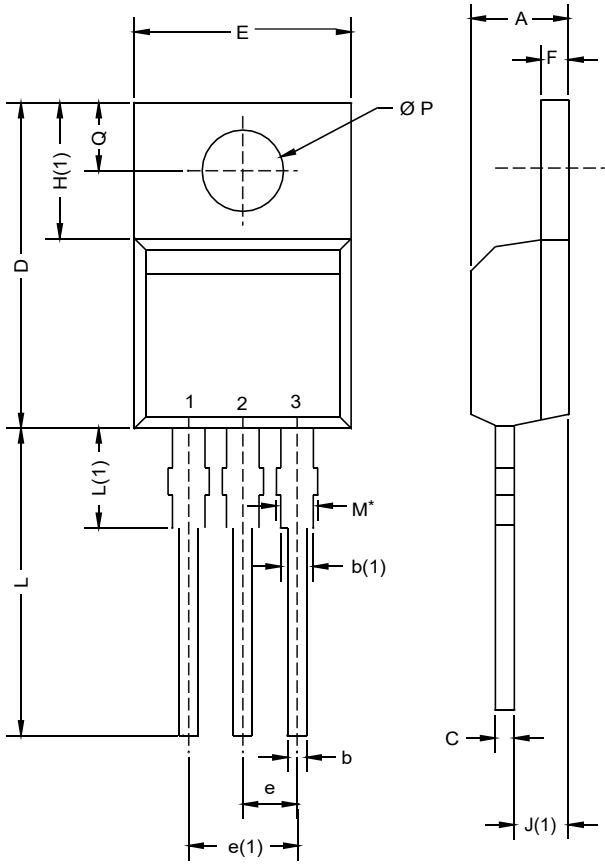
Collector-emitter breakdown voltage vs. temperature



Normalized $V_{GE(th)}$ vs. temperature



TO-220AB



| DIM. | MILLIMETERS | | INCHES | |
|------|-------------|-------|--------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 4.25 | 4.65 | 0.167 | 0.183 |
| b | 0.69 | 1.01 | 0.027 | 0.040 |
| b(1) | 1.20 | 1.73 | 0.047 | 0.068 |
| c | 0.36 | 0.61 | 0.014 | 0.024 |
| D | 14.85 | 15.49 | 0.585 | 0.610 |
| E | 10.04 | 10.51 | 0.395 | 0.414 |
| e | 2.41 | 2.67 | 0.095 | 0.105 |
| e(1) | 4.88 | 5.28 | 0.192 | 0.208 |
| F | 1.14 | 1.40 | 0.045 | 0.055 |
| H(1) | 6.09 | 6.48 | 0.240 | 0.255 |
| J(1) | 2.41 | 2.92 | 0.095 | 0.115 |
| L | 13.35 | 14.02 | 0.526 | 0.552 |
| L(1) | 3.32 | 3.82 | 0.131 | 0.150 |
| Ø P | 3.54 | 3.94 | 0.139 | 0.155 |
| Q | 2.60 | 3.00 | 0.102 | 0.118 |

ECN: X12-0208-Rev. N, DWG: 5471

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

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