## DESCRIPTION

The AM40T65 is available in TO-3PN package.

| $V_{CES}$ | $I_C$ | $V_{CE}$ | $P_D$ |
|---|---|---|---|
| 650V | 40A | 1.55V | 333W |

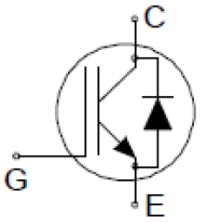
## FEATURE

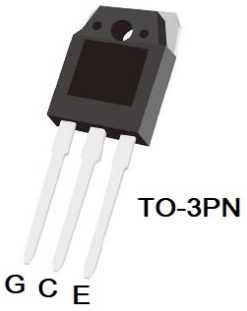
- Fast Switching
- Positive temperature coefficient
- Fast recovery anti-parallel diode

## APPLICATION

- Welding converters
- UPS
- Air condition

## PIN DESCRIPTION




| Pin# | Symbol | Function |
|---|---|---|
| 1 | G | Gate |
| 2 | C | Collector |
| 3 | E | Emitter |

## ORDERING INFORMATION

| Package Type | Part Number | |
|---|---|---|
| TO-3PN<br>SPQ: 30pcs/Tube | TX | AM40T65TXU |
| | | AM40T65TXVU |
| Note | U: Tube<br>V: Halogen free Package | |
| AiT provides all RoHS products | | |

## ABSOLUTE MAXIMUM RATINGS

$T_C$ = 25℃, unless otherwise noted

| | | |
|---|---|---|
| $V_{CES}$, Collector-Emitter Voltage | | 650V |
| $I_C$, Collector Current | $T_C$=25℃ | 80A |
| | $T_C$=100℃ | 40A |
| $I_{CM}$, Pulsed Collector Current (1) | $T_C$=25°C | 120A |
| $I_F$, Diode Continuous Forward Current | $T_C$=25℃ | 40A |
| | $T_C$=100℃ | 20A |
| $I_{FM}$, Diode Maximum Forward Current | $T_C$=25°C | 80A |
| $V_{GES}$, Gate-Emitter Voltage | | ±30V |
| $P_D$, Power Dissipation | $T_C$=25°C | 333W |
| $T_{JMAX}$, Operating Junction Temperature Range | | +150℃ |
| $T_{STG}$, Storage Temperature Range | | -55℃~+175℃ |
| $T_L$, Maximum Temperature for Soldering | | 270℃ |

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

*Pulse width limited by maximum junction temperature

## THERMAL CHARACTERISTICS

| Parameter | Symbol | Typ. | Max | Units |
|---|---|---|---|---|
| Junction-to-Case (IGBT) | $R_{\theta JC}$ | - | 0.45 | ℃/W |
| Junction-to-Case (Diode) | $R_{\theta JC}$ | - | 1.12 | |
| Junction-to-Ambient | $R_{\theta JA}$ | - | 40 | |

## ELECTRICAL CHARACTERISTICS

$T_C$ = 25°C, unless otherwise stated.

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **OFF Characteristics** | | | | | | |
| Collector-Emitter Breakdown Voltage | $V_{CES}$ | $V_{GE}$=0V, $I_C$=-250μA | 650 | - | - | V |
| Collector-Emitter Leakage Current | $I_{CES}$ | $V_{CE}$= 650V, $V_{GE}$=0V | - | - | 4 | μA |
| Gate-Emitter Leakage Current | $I_{GES(F)}$ | $V_{GE}$=+30V | - | - | 200 | nA |
| Gate-Emitter Reverse Leakage | $I_{GES(R)}$ | $V_{GE}$=-30V | - | - | -200 | |
| **ON Characteristics** | | | | | | |
| Collector-Emitter Saturation Voltage | $V_{CE\ (sat)}$ | $V_{GE}$=15V, $I_C$=40A | - | 1.55 | 1.9 | V |
| Gate Threshold Voltage | $V_{GE(TH)}$ | $V_{CE}$=$V_{GE}$, $I_C$=1mA | 4.8 | 5.5 | 6.2 | |
| Pulse width tp≤300μs, δ≤2% | | | | | | |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{CE}$=25V, $V_{GE}$=0V, f=1.0MHz | - | 2170 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 94 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 27 | - | |
| Total Gate Charge | Qg | $I_C$=40A, $V_{CE}$=520V, $V_{GE}$=15V | - | 105 | - | nC |
| **Switching Characteristics** | | | | | | |
| Turn-on Delay Time | $t_{d\ (on)}$ | $I_C$=40A, $V_{CE}$=400V, $V_{GE}$=15V, $R_G$=10Ω, $T_J$=25℃, Inductive Load | - | 30 | - | ns |
| Rise Time | $t_r$ | | - | 65 | - | |
| Turn-Off Delay Time | $t_{d\ (off)}$ | | - | 165 | - | |
| Fall Time | $t_f$ | | - | 23 | - | |
| Turn-On Switching Loss | $E_{on}$ | | - | 1.24 | - | mJ |
| Turn-Off Switching Loss | $E_{off}$ | | - | 0.75 | - | |
| Total Switching Loss | $E_{ts}$ | | - | 1.99 | - | |
| **Diode Characteristics** | | | | | | |
| Diode Forward Voltage | $V_F$ | $I_F$=20A | - | 1.95 | 2.4 | V |
| Reverse Recovery Time | $T_{rr}$ | $I_F$=20A, di/dt=200A/us, $T_J$=25℃ | - | 112 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 650 | - | nC |
| Reverse Recovery Current | $I_{rrm}$ | | - | 10.0 | - | A |

## TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Forward Bias Safe Operating Area

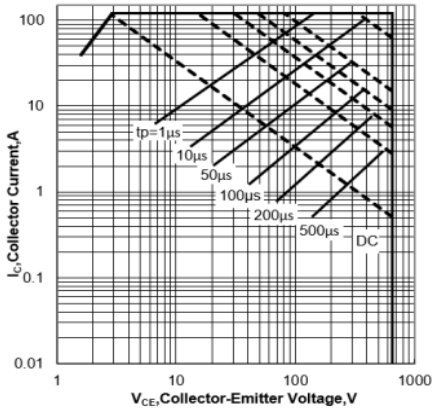



Fig 2. Power Dissipation vs. Case Temperature

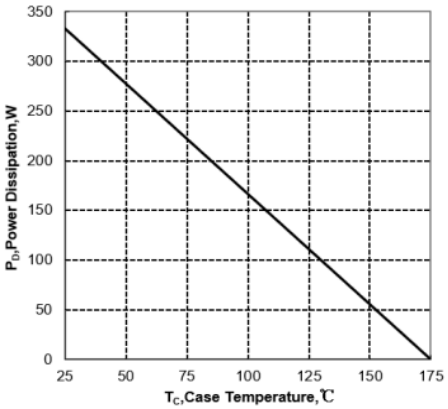



Fig3. Collector Current vs. Case Temperature

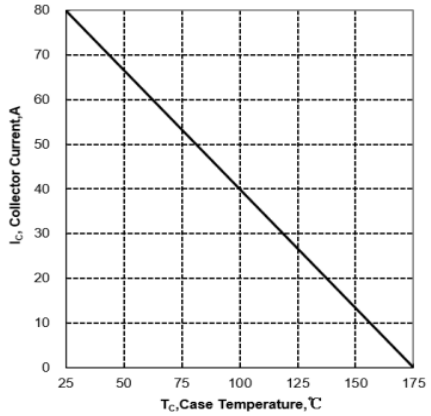



Fig4. Typical Transfer Characteristics

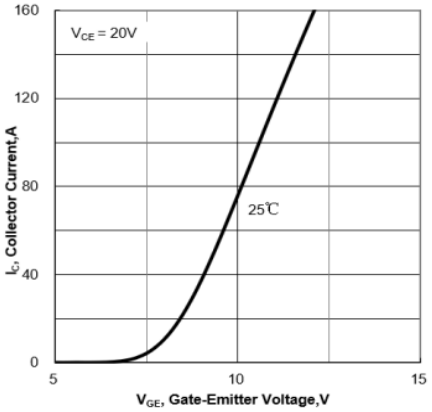



Fig5. Typical Output Characteristics($T_C$=25℃)

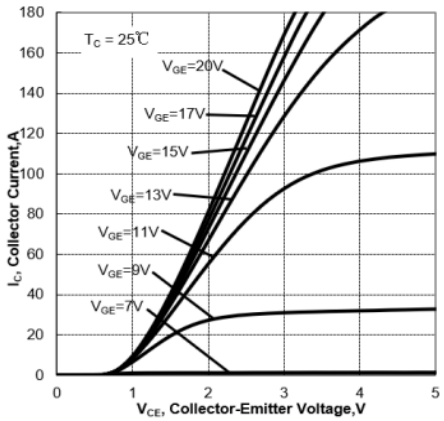



Fig6. Typical Gate Charge

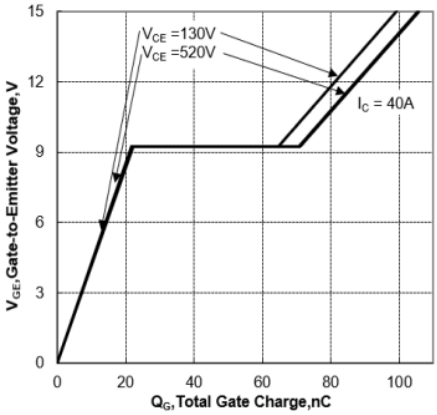


Fig7. Typical Capacitance vs. Collector-Emitter Voltage

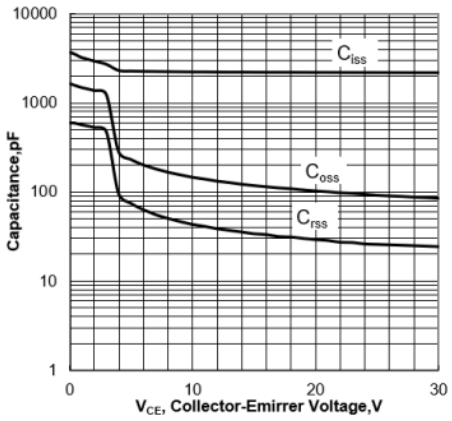



Fig8. IGBT Transient Thermal Impedance vs. Pulse Width

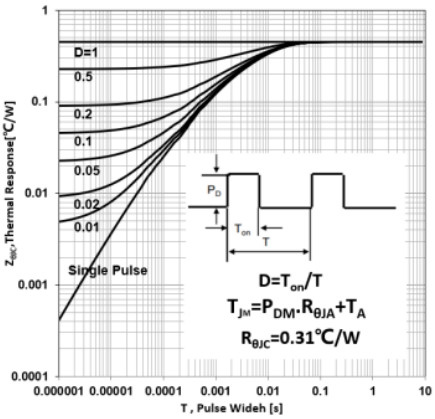



Fig9. Diode Transient Thermal Impedance vs. Pulse Width

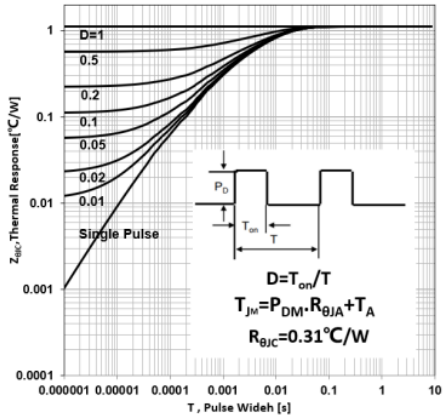



Fig10. Typical Diode Forward Current vs. Forward Voltage

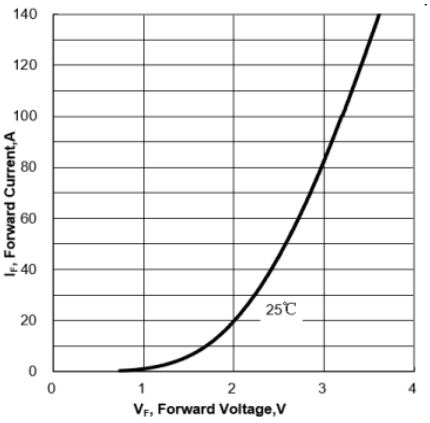



Fig11. Inductive Switching Test Circuit

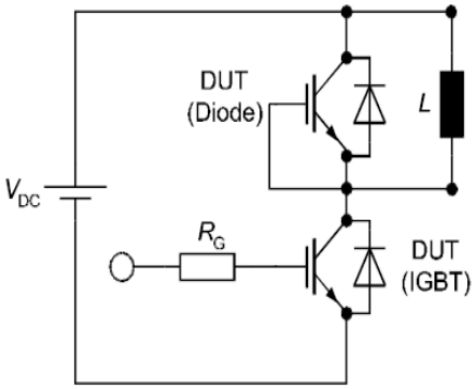



Fig12. Definition of Switching Times

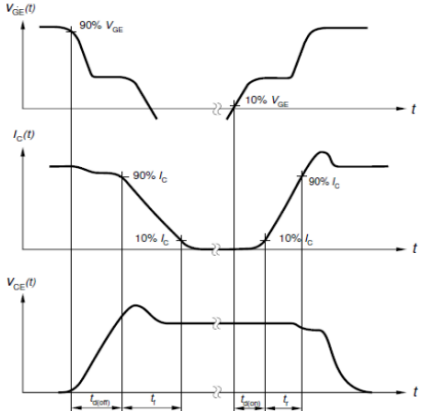


Fig13. Definition of Switching Losses

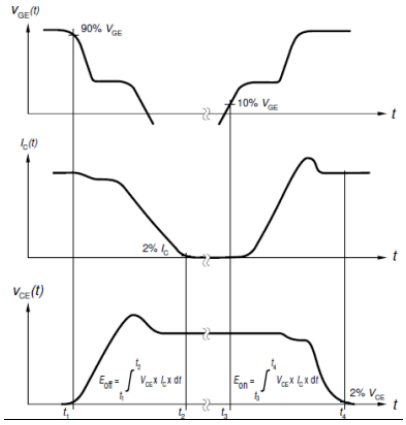
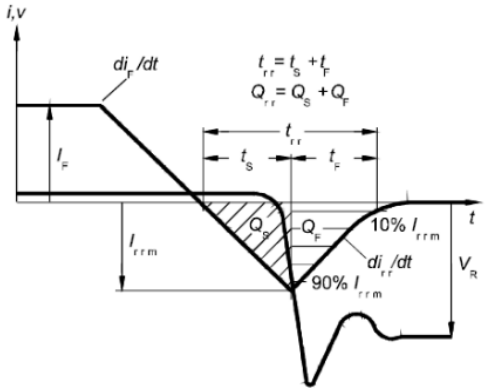
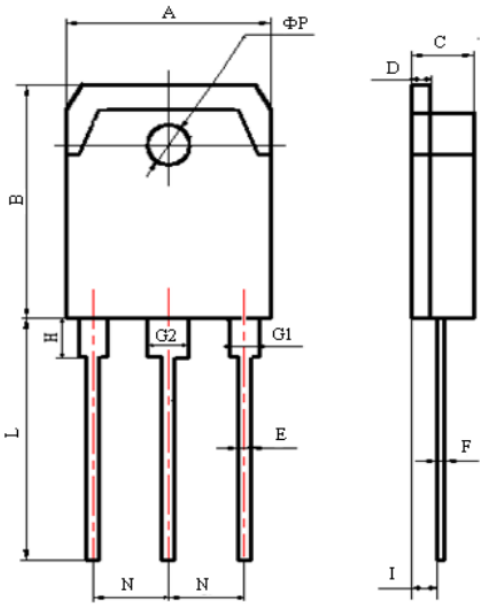



Fig14. Definition of Diode Switching Characteristics



## PACKAGE INFORMATION

Dimension in TO-3PN (Unit: mm)




| Symbol | Min. | Max. |
|---|---|---|
| A | 15.000 | 16.000 |
| B | 19.200 | 20.600 |
| C | 4.600 | 5.000 |
| D | 1.400 | 1.600 |
| E | 0.900 | 1.100 |
| F | 0.500 | 0.700 |
| G1 | 2.000 | 2.200 |
| G2 | 3.000 | 3.200 |
| H | 3.000 | 3.700 |
| I | 1.200 | 2.900 |
| L | 19.000 | 21.000 |
| N | 5.250 | 5.650 |
| ΦP | 3.100 | 3.300 |

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