

Product Summary

| | |
|--------------------------------|-----------|
| V_R | 650V |
| $I_{F(110/133^\circ\text{C})}$ | 26.5A/20A |
| Q_C | 43.5nC |



H3D065A020, H3D065T020, H3D065U020

Features

- Low Conduction and Switching Loss
- Zero Reverse Recovery
- Temperature Independent Switching Behavior
- Positive Temperature Coefficient Device
- High Surge Current Capability
- RoHS Compliant and Halogen Free
- Suitable for High Speed Application

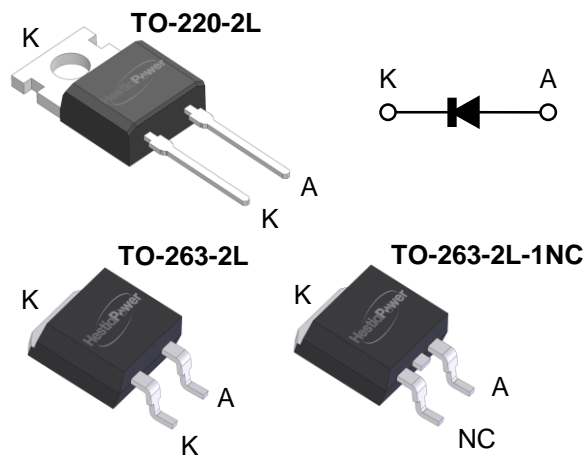
Benefits

- Higher System Efficiency
- Increase Parallel Device Convenience
- Enable High Temperature Application
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems
- High Reliability

Applications

- Switching Mode Power Supply
- PFC
- UPS
- Motor Drives
- Flywheel diode in Power Inverters
- Solar/Wind Renewable Energy

Circuit Diagram



| Part Number | Package | Marking |
|-------------|---------------|------------|
| H3D065A020 | TO-220-2L | H3D065A020 |
| H3D065T020 | TO-263-2L | H3D065T020 |
| H3D065U020 | TO-263-2L-1NC | H3D065U020 |

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Conditions | Value | Unit |
|---|----------------|--|------------|----------------------|
| Peak Repetitive Reverse Voltage | V_{RRM} | $I_R = 100 \mu\text{A}$ | 650 | V |
| Peak Reverse Surge Voltage | V_{RSM} | $T_J = 25^\circ\text{C}$ | 650 | V |
| DC Blocking Voltage | V_R | $T_J = 25^\circ\text{C}$ | 650 | V |
| Continuous Forward Current | I_F | $T_C = 25^\circ\text{C}$ | 43.5 | A |
| | | $T_C = 110^\circ\text{C}$ | 26.5 | |
| | | $T_C = 133^\circ\text{C}$ | 20 | |
| Non-Repetitive Peak Forward Surge Current | I_{FSM} | $T_C = 25^\circ\text{C}$, $T_p = 10 \text{ ms}$, Half Sine Wave | 133 | A |
| | | $T_C = 125^\circ\text{C}$, $T_p = 10 \text{ ms}$, Half Sine Wave | 116 | |
| | | $T_C = 25^\circ\text{C}$, $T_p = 10 \mu\text{s}$, Pulse | 689 | |
| Repetitive Peak Forward Surge Current | I_{FRM} | $T_C = 25^\circ\text{C}$, $T_p = 10 \text{ ms}$ Half Sine Wave, $D = 0.1$ | 99 | A |
| | | $T_C = 125^\circ\text{C}$, $T_p = 10 \text{ ms}$ Half Sine Wave, $D = 0.1$ | 79 | |
| Power Dissipation | P_D | $T_C = 25^\circ\text{C}$ | 130 | W |
| | | $T_C = 125^\circ\text{C}$ | 43.5 | |
| I^2t value | $\int i^2 dt$ | $T_C = 25^\circ\text{C}$, $T_p = 10 \text{ ms}$ | 88 | A^2s |
| Junction & Storage Temperature | T_J, T_{stg} | | -55 to 175 | $^\circ\text{C}$ |
| Soldering Temperature | T_L | | 260 | |
| Mounting Torque | M_D | M3 or 6-32 screw (through hole only) | 1.0 | Nm |

Electrical Characteristics (T_c = 25°C unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|-----------------|---|-------|------|------|------|
| DC Blocking Voltage | V _{DC} | I _R = 100 μA, T _J = 25°C | > 650 | | | V |
| Forward Voltage | V _F | I _F = 20A, T _J = 25°C | | 1.5 | 1.8 | V |
| | | I _F = 20A, T _J = 175°C | | 1.8 | 2.1 | V |
| Reverse Current | I _R | V _R = 650V, T _J = 25°C | | 2 | 100 | μA |
| | | V _R = 650V, T _J = 175°C | | 30 | 500 | μA |
| Total Capacitive Charge | Q _C | V _R = 400V, T _J = 25°C | | 43.5 | | nC |
| Total Capacitance | C _j | V _R = 1V, T _J = 25°C, f = 1 MHz | | 844 | | |
| | | V _R = 300V, T _J = 25°C, f = 1 MHz | | 89 | | pF |
| | | V _R = 600V, T _J = 25°C, f = 1 MHz | | 84 | | |
| Capacitance Stored Energy | E _C | V _R = 400V | | 8.5 | | μJ |

Thermal Resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|------------------|------|------|------|------|
| Thermal Resistance, Junction to Case | R _{θJC} | | 1.15 | | °C/W |
| Thermal Resistance, Junction to Ambient | R _{θJA} | | | | °C/W |

Naming Rule

H3 D 065 A 020

Generation

H3 = 3rd Gen Discrete

Device Type

S = JBS diode (High Power) D = JBS diode (High Speed)

Breakdown Voltage

065 = 650V 120 = 1200V 170 = 1700V

Package

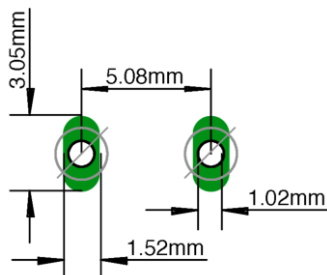
A = TO-220-2L T = TO-263-2L U = TO-263-2L-1NC

Typical Current Rating

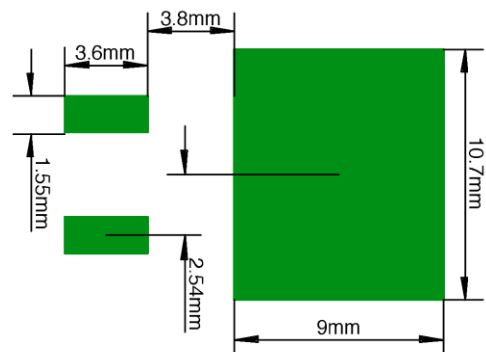
002 = 2A 005 = 5A 008 = 8A 010 = 10A 012 = 12A 020 = 20A

Recommended Solder Pad Layout

TO-220-2L



TO-263-2L, TO-263-2L-1NC



Typical Device Performance

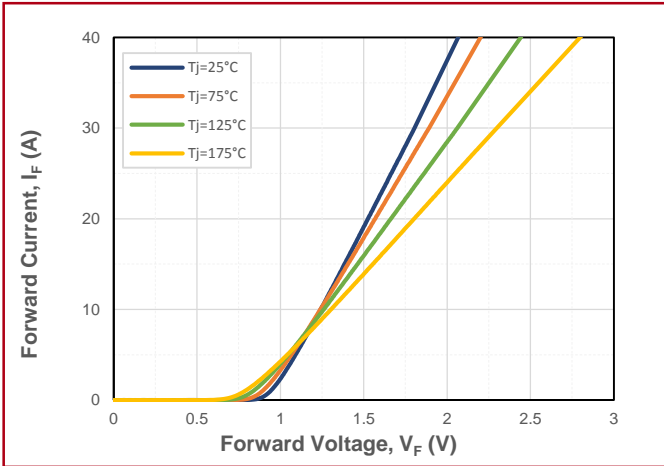


Fig.1 Forward Characteristics

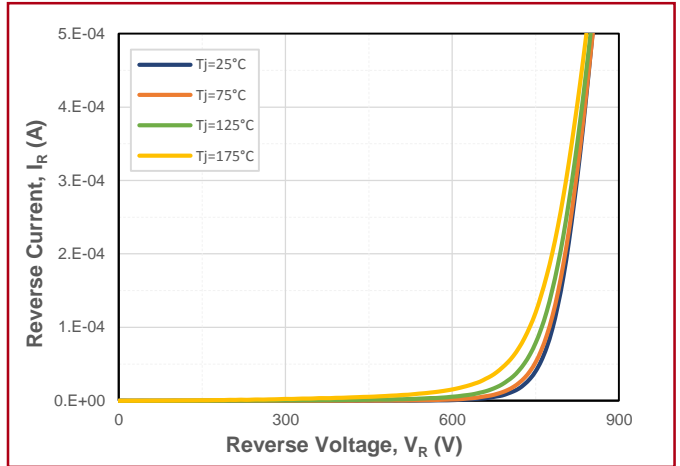


Fig.2 Reverse Characteristics

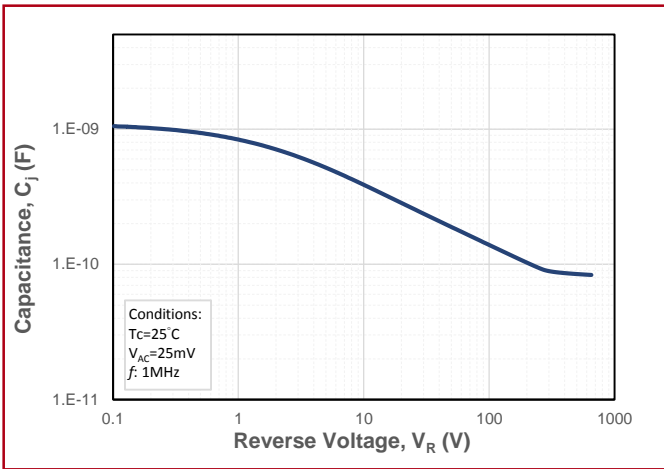


Fig.3 Junction Capacitance vs. Reverse Voltage

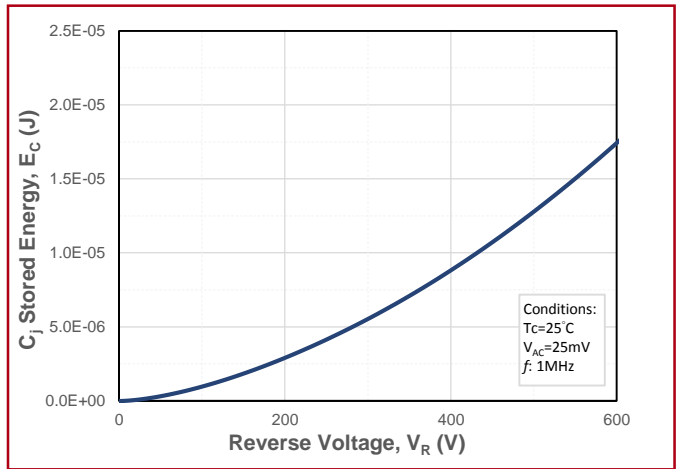


Fig.4 Capacitance Stored Energy

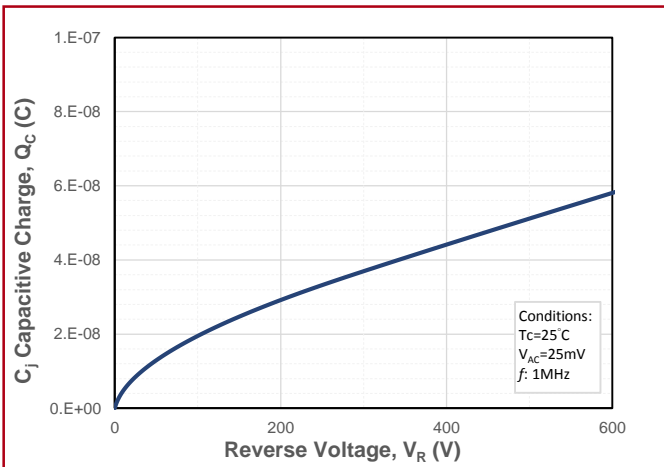


Fig.5 Recovery Charge vs. Reverse Voltage

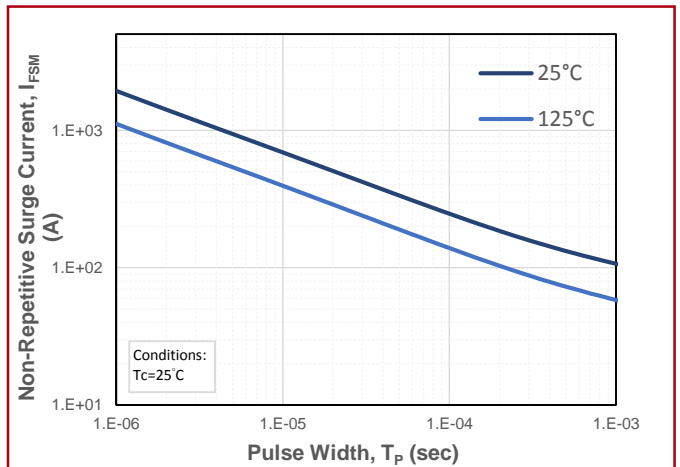


Fig.6 Non-Repetitive Peak Forward Surge Current (Pulse Mode)

Typical Device Performance

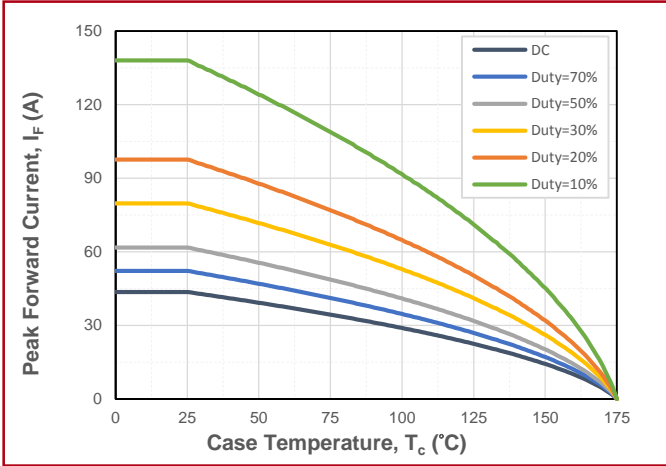


Fig.7 Maximum Forward Current Derating vs. Case Temperature

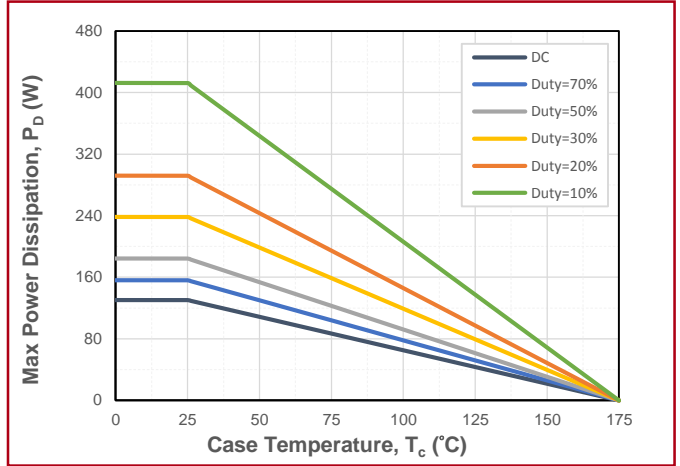


Fig.8 Maximum Power Dissipation Derating vs. Case Temperature

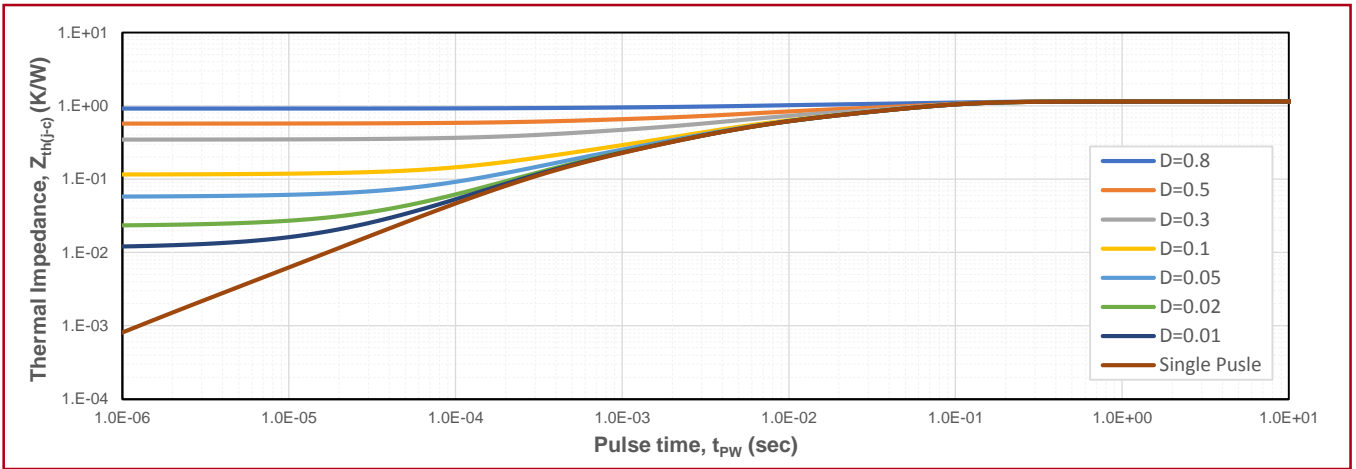
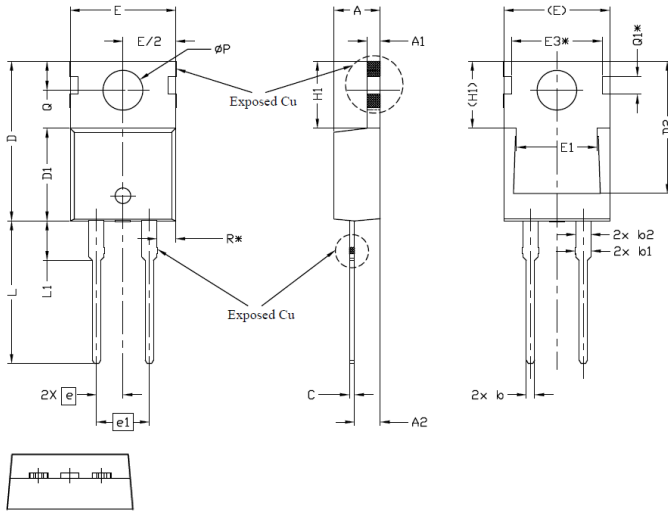


Fig.9 Transient Junction to Case Thermal Impedance

The information provided herein is subject to change without notice.

Package Dimensions (TO-220-2L)

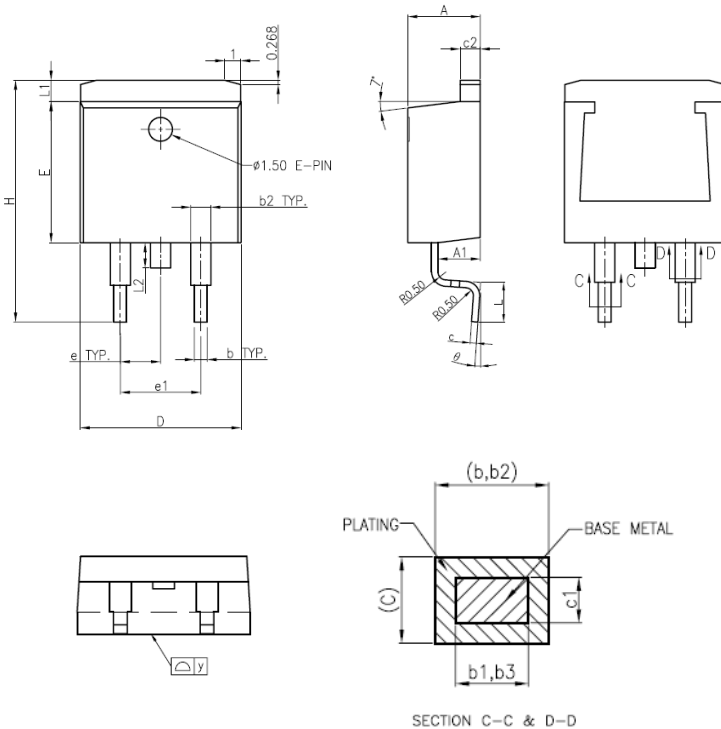


Note:

1. Package Reference: JEDEC TO220, Variation AB.
2. All Dimensions Are In mm.
3. Slot Required, Notch May Be Rounded
4. Dimension D & E Do Not Include Mold Flash. Mold Flash Shall Not Exceed 0.127mm Pre Side. These Dimensions Are Measured At The Outermost Extreme Of The Plastic Body.
5. Thermal Pad Contour Optional Within Dimensions E, H1, D2 & E1.
6. Dimension E2 & H1 Define A Zone Where Stamping And Singulation Irregularities Are Allowed.
7. "*" is reference .

| Symbol | mm | | |
|--------|-----------|-------|-------|
| | Min. | Typ. | Max. |
| A | 4.24 | 4.44 | 4.64 |
| A1 | 1.15 | 1.27 | 1.40 |
| A2 | 2.30 | 2.48 | 2.70 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | 1.20 | 1.55 | 1.75 |
| b2 | 1.20 | 1.45 | 1.70 |
| c | 0.40 | 0.50 | 0.60 |
| D | 14.70 | 15.37 | 16.00 |
| D1 | 8.82 | 8.92 | 9.02 |
| D2 | 12.63 | 12.73 | 12.83 |
| E | 9.96 | 10.16 | 10.36 |
| E1 | 6.86 | 7.77 | 8.89 |
| E3* | 8.70 REF. | | |
| e | 2.54 BSC | | |
| e1 | 5.08 BSC | | |
| H1 | 6.30 | 6.45 | 6.60 |
| L | 13.47 | 13.72 | 13.97 |
| L1 | 3.60 | 3.80 | 4.00 |
| φP | 3.75 | 3.84 | 3.93 |
| Q | 2.60 | 2.80 | 3.00 |
| Q1* | 1.73 REF. | | |
| R* | 1.82 REF. | | |

Package Dimensions (TO-263-2L, TO-263-2L-1NC)



| Symbol | mm | | |
|--------|----------|-------|-------|
| | Min. | Typ. | Max. |
| A | 4.47 | - | 4.67 |
| A1 | 2.52 | - | 2.82 |
| b | 0.71 | 0.81 | 0.91 |
| b1 | 0.71 | - | 0.91 |
| b2 | 1.17 | 1.27 | 1.37 |
| b3 | 1.17 | - | 1.37 |
| c | 0.279 | - | 0.483 |
| c1 | 0.279 | 0.38 | 0.432 |
| c2 | 1.17 | - | 1.37 |
| D | 10.01 | - | 10.31 |
| E | 8.76 | 8.89 | 9.02 |
| E1 | 10.40 | 10.55 | 10.66 |
| e | 2.54 BSC | | |
| e1 | 4.98 | - | 5.18 |
| H | 15.00 | - | 15.85 |
| L | 2.29 | 2.54 | 2.79 |
| L1 | 1.27 | - | 1.40 |
| L2* | 1.30 | - | 1.75 |
| y | 0 | - | 0.08 |
| θ | 0° | - | 8° |

*L2 = 0 for TO-263-2L