

International IR Rectifier

42CTQ030SPbF 42CTQ030-1PbF

SCHOTTKY RECTIFIER

40 Amp

$$I_{F(AV)} = 40\text{Amp}$$

$$V_R = 30\text{V}$$

Major Ratings and Characteristics

| Characteristics | Values | Units |
|---|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform | 40 | A |
| V_{RRM} | 30 | V |
| I_{FSM} @ tp = 5 μ s sine | 1100 | A |
| V_F @ 20 Apk, $T_J = 125^\circ\text{C}$ (per leg) | 0.38 | V |
| T_J range | -55 to 150 | $^\circ\text{C}$ |

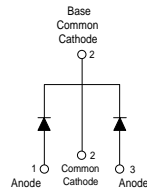
Description/ Features

This center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150° C T_J operation
- Center tap configuration
- Very low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead- Free ("PbF" suffix)

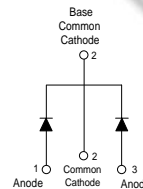
Case Styles

42CTQ030SPbF



D²PAK

42CTQ030-1PbF



TO-262

Voltage Ratings

| Parameters | 42CTQ030SPbF, 42CTQ030-1PbF |
|---|-----------------------------|
| V_R Max. DC Reverse Voltage (V) | 30 |
| V_{RWM} Max. Working Peak Reverse Voltage (V) | |

Absolute Maximum Ratings

| Parameters | Values | Units | Conditions |
|--|--------|-------|--|
| $I_{F(AV)}$ Max. Average Forward (Per Leg) Current * See Fig. 5 (Per Device) | 20 | A | 50% duty cycle @ $T_C = 121^\circ\text{C}$, rectangular wave form |
| | 40 | | |
| I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7 | 1100 | A | 5 μs Sine or 3 μs Rect. pulse |
| | 360 | | 10ms Sine or 6ms Rect. pulse |
| E_{AS} Non-Repetitive Avalanche Energy (Per Leg) | 13 | mJ | $T_J = 25^\circ\text{C}$, $I_{AS} = 3$ Amps, $L = 2.90$ mH |
| I_{AR} Repetitive Avalanche Current (Per Leg) | 3 | A | Current decaying linearly to zero in 1 μsec Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical |

Electrical Specifications

| Parameters | Values | Units | Conditions |
|---|--------|------------------|---|
| V_{FM} Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1) | 0.48 | V | @ 20A |
| | 0.57 | V | @ 40A |
| | 0.38 | V | @ 20A |
| | 0.51 | V | @ 40A |
| I_{RM} Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1) | 3 | mA | $T_J = 25^\circ\text{C}$ |
| | 183 | mA | $T_J = 125^\circ\text{C}$ |
| $V_{F(TO)}$ Threshold Voltage | 0.22 | V | $T_J = T_J$ max. |
| r_t Forward Slope Resistance | 6.76 | m Ω | |
| C_T Max. Junction Capacitance (Per Leg) | 2840 | pF | $V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) 25°C |
| L_S Typical Series Inductance (Per Leg) | 8.0 | nH | Measured lead to lead 5mm from package body |
| dv/dt Max. Voltage Rate of Change | 10000 | V/ μs | (Rated V_R) |

(1) Pulse Width < 300 μs , Duty Cycle < 2%

Thermal-Mechanical Specifications

| Parameters | Values | Units | Conditions |
|--|------------|-------------------------------|--------------------------------------|
| T_J Max. Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ | |
| T_{stg} Max. Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ | |
| R_{thJC} Max. Thermal Resistance Junction to Case (Per Leg) | 2.0 | $^\circ\text{C}/\text{W}$ | DC operation |
| R_{thJC} Max. Thermal Resistance Junction to Case (Per Package) | 1.0 | $^\circ\text{C}/\text{W}$ | DC operation |
| R_{thCS} Typical Thermal Resistance, Case to Heatsink | 0.50 | $^\circ\text{C}/\text{W}$ | Mounting surface, smooth and greased |
| wt Approximate Weight | 2 (0.07) | g (oz.) | |
| T Mounting Torque | Min. | 6 (5) | Kg-cm (lbf-in) |
| | Max. | 12 (10) | |
| Marking Device | 42CTQ030S | Case style D ² Pak | |
| | 42CTQ030-1 | Case style TO-262 | |

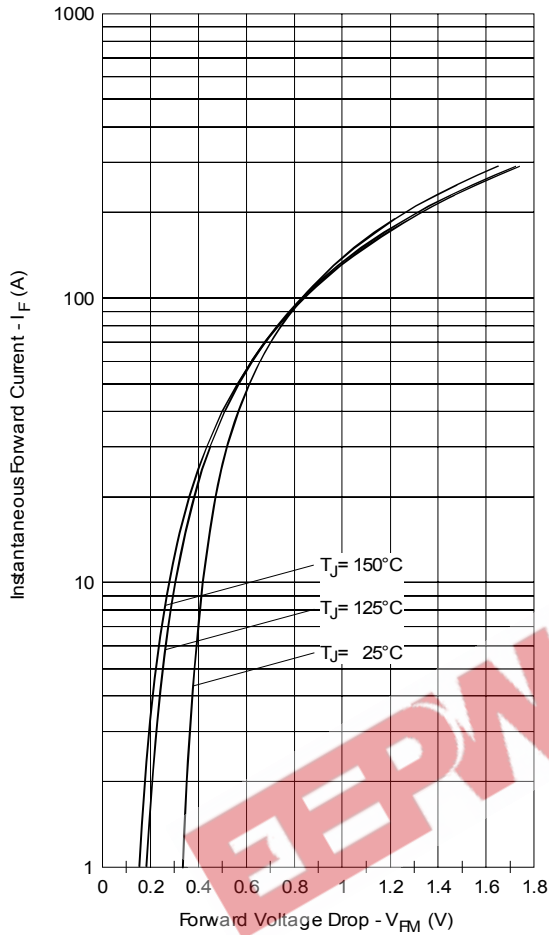


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

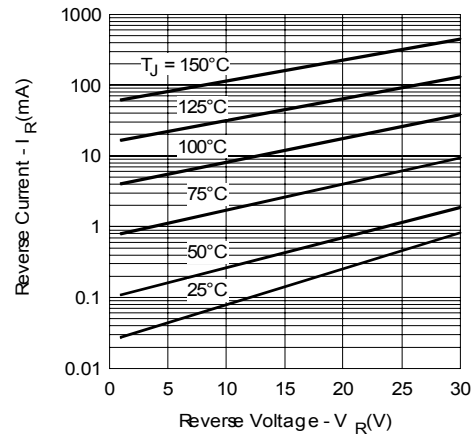


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

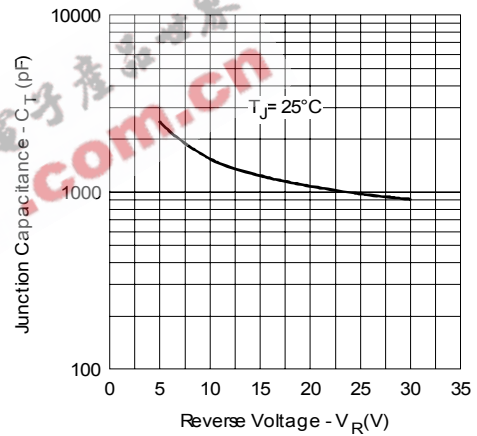


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

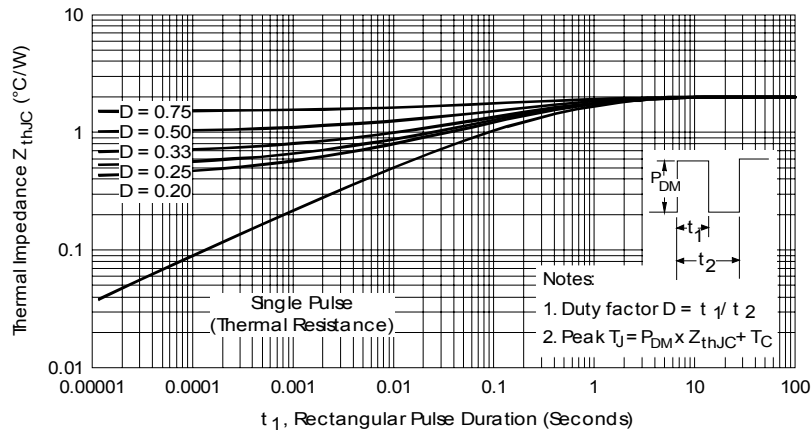


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

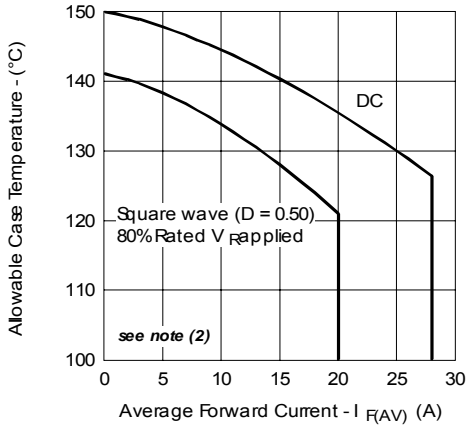


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

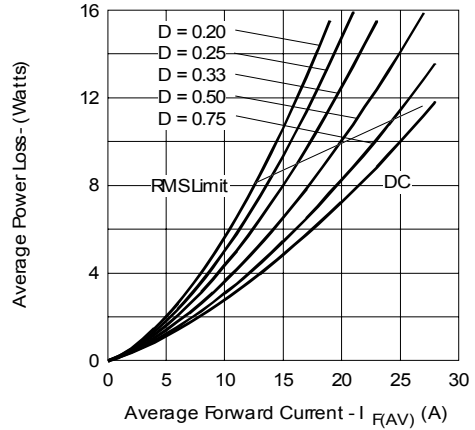


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

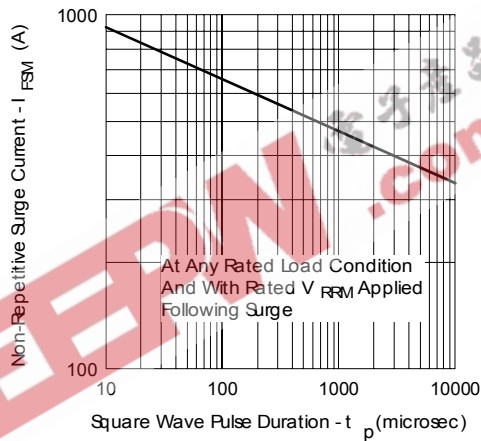


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

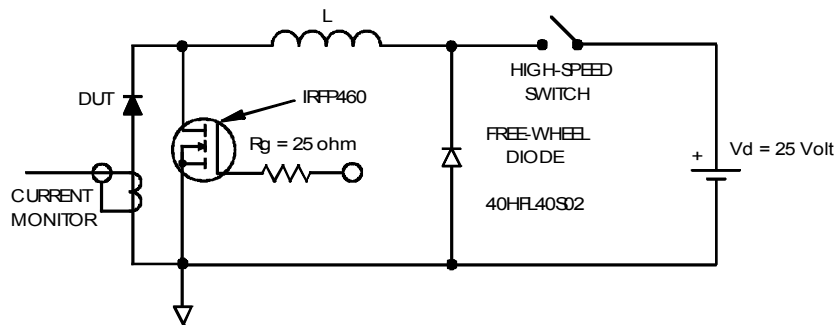


Fig. 8 - Unclamped Inductive Test Circuit

(2) Formula used: $T_c = T_j - (Pd + Pd_{REV}) \times R_{thJC}$;

$Pd = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$ (see Fig. 6);

$Pd_{REV} = \text{Inverse Power Loss} = V_{R1} \times I_R (1 - D); I_R @ V_{R1} = 10V$

Outlines Table

NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
 4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
 5. CONTROLLING DIMENSION: INCH.

| SYMBOL | DIMENSIONS | | | | NOTES |
|--------|-------------|-------|----------|------|-------|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | .160 | .190 | 4 |
| A1 | 0.00 | 0.254 | .000 | .010 | |
| b | 0.51 | 0.99 | .020 | .039 | |
| b1 | 0.51 | 0.89 | .020 | .035 | |
| b2 | 1.14 | 1.78 | .045 | .070 | 4 |
| c | 0.38 | 0.74 | .015 | .029 | |
| c1 | 0.38 | 0.58 | .015 | .023 | |
| c2 | 1.14 | 1.65 | .045 | .065 | 3 |
| D | 8.51 | 9.65 | .335 | .380 | |
| D1 | 6.86 | - | .270 | - | |
| E | 9.65 | 10.67 | .380 | .420 | 3 |
| E1 | 6.22 | - | .245 | - | |
| e | 2.54 BSC | | .100 BSC | | 4 |
| H | 14.61 | 15.88 | .575 | .625 | |
| L | 1.78 | 2.79 | .070 | .110 | |
| L1 | - | 1.65 | - | .065 | |
| L2 | 1.27 | 1.78 | .050 | .070 | 3 |
| L3 | 0.25 BSC | | .010 BSC | | |
| L4 | 4.78 | 5.28 | .188 | .208 | |
| m | 17.78 | - | .700 | - | 4 |
| m1 | 8.89 | - | .350 | - | |
| n | 11.43 | - | .450 | - | 4 |
| o | 2.08 | - | .082 | - | |
| p | 3.81 | - | .150 | - | 4 |
| R | 0.51 | 0.71 | .020 | .028 | |
| θ | 90° | 93° | 90° | 93° | |

LEAD ASSIGNMENTS

HEXFET
 1.- GATE
 2, 4.- DRAIN
 3.- SOURCE

IGBTs, CoPACK
 1.- GATE
 2, 4.- COLLECTOR
 3.- EMITTER

DIODES
 1.- ANODE *
 2, 4.- CATHODE
 3.- ANODE

* PART DEPENDENT.

Conform to JEDEC outline D²Pak (SMD-220)
 Dimensions in millimeters and (inches)

NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
 4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
 5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
 6. CONTROLLING DIMENSION: INCH.
 7.- OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

| SYMBOL | DIMENSIONS | | | | NOTES |
|--------|-------------|-------|----------|------|-------|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | .160 | .190 | 5 |
| A1 | 2.03 | 3.02 | .080 | .119 | |
| b | 0.51 | 0.99 | .020 | .039 | |
| b1 | 0.51 | 0.89 | .020 | .035 | |
| b2 | 1.14 | 1.78 | .045 | .070 | 5 |
| b3 | 1.14 | 1.73 | .045 | .068 | |
| c | 0.38 | 0.74 | .015 | .029 | |
| c1 | 0.38 | 0.58 | .015 | .023 | 5 |
| c2 | 1.14 | 1.65 | .045 | .065 | |
| D | 8.88 | 9.65 | .330 | .380 | 3 |
| D1 | 6.86 | - | .270 | - | |
| E | 9.65 | 10.67 | .380 | .420 | 3, 4 |
| E1 | 6.22 | - | .245 | - | |
| e | 2.54 BSC | | .100 BSC | | 4 |
| L | 13.46 | 14.10 | .530 | .555 | |
| L1 | - | 1.65 | - | .065 | |
| L2 | 3.56 | 3.71 | .140 | .146 | |

LEAD ASSIGNMENTS

HEXFET
 1.- GATE
 2.- DRAIN
 3.- SOURCE
 4.- DRAIN

IGBTs, CoPACK
 1.- GATE
 2.- COLLECTOR
 3.- EMITTER
 4.- COLLECTOR

Modified JEDEC outline TO-262
 Dimensions in millimeters and (inches)

Part Marking Information

D²PAK

EXAMPLE: THIS IS A 42CTQ030S
LOT CODE 8024
ASSEMBLED ON WW 02, 2000

Note: "P" in assembly line position indicates "Lead-Free"

TO-262

EXAMPLE: THIS IS A 42CTQ030-1
LOT CODE 1789
ASSEMBLED ON WW 19, 1999

Note: "P" in assembly line position indicates "Lead-Free"

Tape & Reel Information

SECTION Y-Y

| | | | |
|----|-------|-----|-----|
| Ao | 10.50 | +/- | 0.1 |
| Bo | 15.80 | +/- | 0.1 |
| B2 | 10.25 | +/- | 0.1 |
| Ko | 4.90 | +/- | 0.1 |
| F | 11.50 | +/- | 0.1 |
| P1 | 16.00 | +/- | 0.1 |
| W | 24.00 | +/- | 0.3 |

NOTES:

- 1.0 SPROCKET HOLE PITH CUMULATIVE TOLERANCE ±.02
- 2.0 CAMBER NOT TO EXCEED 1mm in 100mm
- 3.0 MATERIAL: CONDUCTIVE BLACK STYRENIC ALLOY
- 4.0 Ko MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
- 5.0 MEASURED FROM CENTRELINE OF SPROCKET HOLE TO CENTRELINE OF POCKET
- 6.0 VENDOR: (OPTIONAL)
- 7.0 MUST ALSO MEET REQUIREMENTS OF EIA STANDAR #EIA-481A TAPING OF SURFACE MOUNT COMPONENTS FOR AUTOMATIC PLACEMENT
- 8.0 SURFACE RESISTIVITY OF MOLDED MATL. MUST MEASURE LESS OR EQUAL TO 10⁶ OHMS PER SQUARE. MEASURED IN ACCORDANCE TO PROCEDURE GIVEN IN ASTM D-257 & ASTM D-991
- 9.0 TOTAL LENGTH PER REEL MUST BE 45 METERS
- 10.0 Ⓢ CRITICAL

Dimensions in millimeters and (inches)

Ordering Information Table

| Device Code | | | | | | | | | | | | | | | | | |
|-------------|--|----|---|-----|---|-----|-----|-----|-----|---|---|---|---|---|---|---|---|
| | <table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">42</td> <td style="padding: 5px;">C</td> <td style="padding: 5px;">T</td> <td style="padding: 5px;">Q</td> <td style="padding: 5px;">030</td> <td style="padding: 5px;">S</td> <td style="padding: 5px;">TRL</td> <td style="padding: 5px;">PbF</td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> <td style="text-align: center;">⑦</td> <td style="text-align: center;">⑧</td> </tr> </table> | 42 | C | T | Q | 030 | S | TRL | PbF | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| 42 | C | T | Q | 030 | S | TRL | PbF | | | | | | | | | | |
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | | | | | | | | | | |
| 1 | - Current Rating (40A) | | | | | | | | | | | | | | | | |
| 2 | - Circuit Configuration C = Common Cathode | | | | | | | | | | | | | | | | |
| 3 | - T = TO-220 | | | | | | | | | | | | | | | | |
| 4 | - Schottky "Q" Series | | | | | | | | | | | | | | | | |
| 5 | - Voltage Rating (030 = 30V) | | | | | | | | | | | | | | | | |
| 6 | - • S = D ² Pak • -1= TO-262 | | | | | | | | | | | | | | | | |
| 7 | - • none = Tube (50 pieces) • TRL = Tape & Reel (Left Oriented - for D ² Pak only) • TRR = Tape & Reel (Right Oriented - for D ² Pak only) | | | | | | | | | | | | | | | | |
| 8 | - • none = Standard Production • PbF = Lead-Free | | | | | | | | | | | | | | | | |

Data and specifications subject to change without notice.
 This product has been designed and qualified for Industrial Level and Lead-Free.
 Qualification Standards can be found on IR's Web site.