



20TQ...  
20TQ...S

SCHOTTKY RECTIFIER

20 Amp

$I_{F(AV)} = 19\text{Amp}$   
 $V_R = 35/ 45\text{V}$

**Major Ratings and Characteristics**


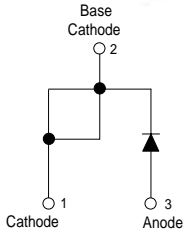

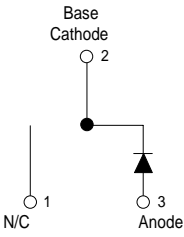
Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	20	A
$V_{RRM}$ range	35/45	V
$I_{FSM}$ @tp = 5 $\mu$ s sine	1800	A
$V_F$ @20 Apk, $T_J = 125^\circ\text{C}$	0.51	V
$T_J$ range	-55 to 150	$^\circ\text{C}$

**Description/ Features**

The 20TQ Schottky rectifier series 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
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

**Case Styles**

<p>20TQ...</p>  <p>Base Cathode 2</p>  <p>1 Cathode 3 Anode</p> <p>TO-220AC</p>	<p>20TQ... S</p>  <p>Base Cathode 2</p>  <p>1 N/C 3 Anode</p> <p>D<sup>2</sup>PAK</p>
---	---

## Voltage Ratings

Part number	20TQ035	20TQ040	20TQ045
$V_R$ Max. DC Reverse Voltage (V)	35	40	45
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)			

## Absolute Maximum Ratings

Parameters	20TQ	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current * See Fig. 5	20	A	50% duty cycle @ $T_C = 116^\circ\text{C}$ , rectangular wave form
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current * See Fig. 7	1800	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse
	400		10ms Sine or 6ms Rect. pulse
$E_{AS}$ Non-Repetitive Avalanche Energy	27	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 4\text{ Amps}$ , $L = 3.4\text{ mH}$
$I_{AR}$ Repetitive Avalanche Current	4	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ Frequency limited by $T_J$ , max. $V_A = 1.5 \times V_R$ typical

## Electrical Specifications

Parameters	20TQ	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (1) * See Fig. 1	0.57	V	@ 20A
	0.73	V	@ 40A
	0.51	V	@ 20A
	0.67	V	@ 40A
$I_{RM}$ Max. Reverse Leakage Current (1) * See Fig. 2	2.7	mA	$T_J = 25^\circ\text{C}$
	105	mA	$T_J = 125^\circ\text{C}$
$C_T$ Max. Junction Capacitance	1400	pF	$V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$
$L_S$ Typical Series Inductance	8.0	nH	Measured lead to lead 5mm from package body
$dv/dt$ Max. Voltage Rate of Change (Rated $V_R$ )	10000	V/ $\mu\text{s}$	

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%

## Thermal-Mechanical Specifications

Parameters	20TQ	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	1.50	$^\circ\text{C}/\text{W}$	DC operation * See Fig. 4
$R_{thCS}$ 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	20TQ045		Case Style TO-220
	20TQ045S		Case Style D <sup>2</sup> Pak

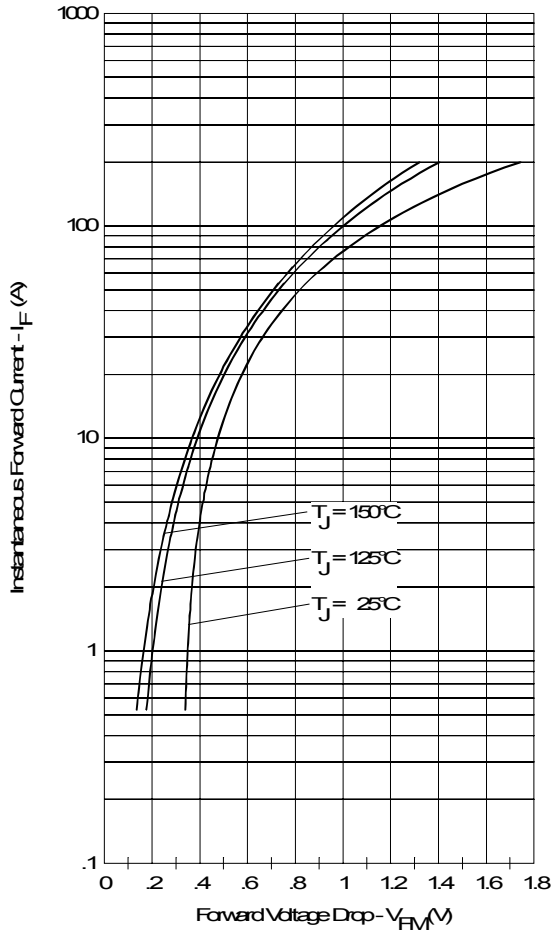


Fig. 1 - Maximum Forward Voltage Drop Characteristics

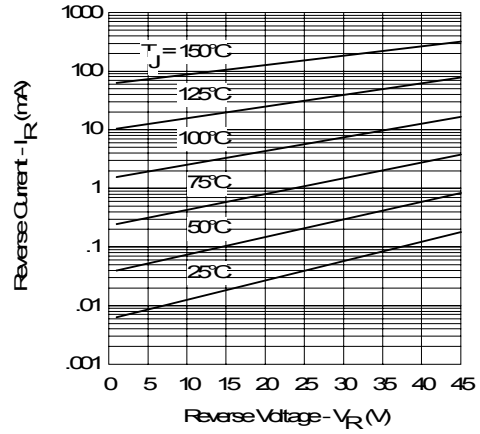


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

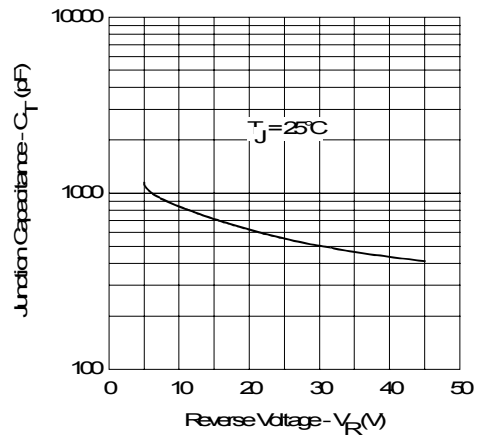


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

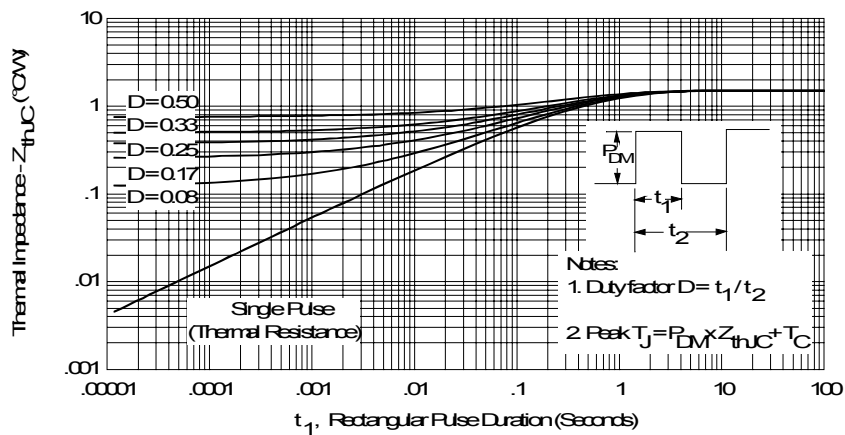


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

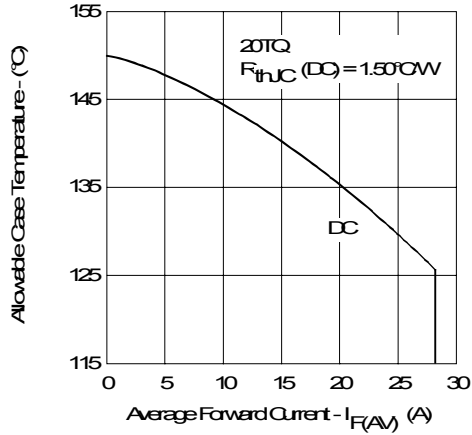


Fig. 5 - Maximum Allowable Case Temperature Vs. Average Forward Current

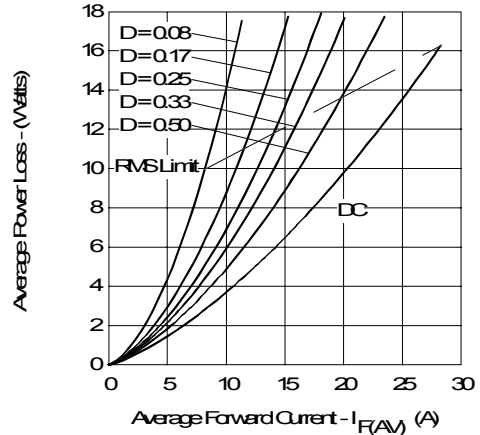


Fig. 6 - Forward Power Loss Characteristics

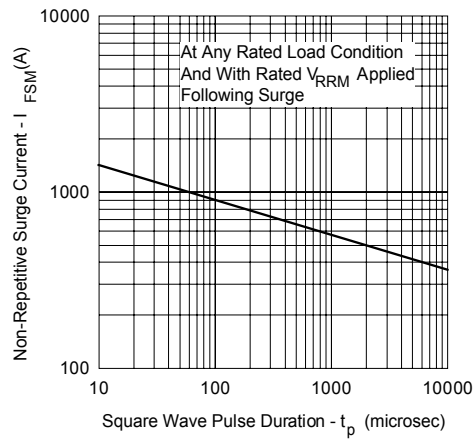


Fig. 7 - Maximum Non-Repetitive Surge Current

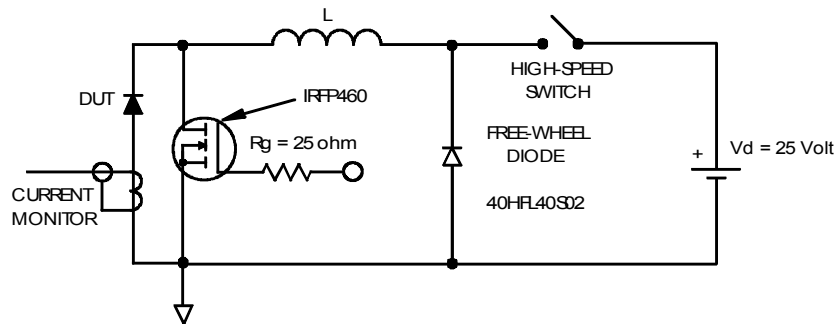


Fig. 8 - Unclamped Inductive Test Circuit

Outline Table

**NOTES:**

- 1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.- DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 5.- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
- 6.- CONTROLLING DIMENSION : INCHES.
- 7.- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
- 8.- DIMENSION E2 IS HI DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- 9.- OUTLINE CONFORMS TO JEDEC TO-220, D2 (min) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	-	0.76	-	.030	8
e	2.54 BSC		.100 BSC		
e1	1.00 BSC		.039 BSC		
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	-	6.35	-	.250	3
L3	1.78	2.13	.070	.084	
L4	0.76	1.27	.030	.050	
φP	3.53	3.73	.139	.147	
Q	2.54	3.05	.100	.120	

**LEAD ASSIGNMENTS**  
 DIODES  
 1.- ANODE  
 2.- CATHODE

**Conform to JEDEC outline TO-220AC**  
 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 [ .005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST 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	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.78	.045	.070	
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	4
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86	.270			
E	9.65	10.67	.380	.420	3
E1	6.22	.245			
e	2.54 BSC		.100 BSC		
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	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	
m	17.78	.700			
m1	8.89	.350			
n	11.43	.450			
o	2.08	.082			
p	3.81	.150			
R	0.51	0.71	.020	.028	
θ	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**  
 HEXFET  
 1.- GATE  
 2.- 4.- COLLECTOR  
 3.- EMITTER

**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)

Part Marking Information

**TO-220AC**

EXAMPLE: THIS IS A 20TQ045  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2001  
IN THE ASSEMBLY LINE "C"

INTERNATIONAL RECTIFIER LOGO  
ASSEMBLY LOT CODE  
PART NUMBER  
DATE CODE  
YEAR 1 = 2001  
WEEK 19  
LINE C

**D<sup>2</sup>Pak**

EXAMPLE: THIS IS A 20TQ045S  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000

INTERNATIONAL RECTIFIER LOGO  
ASSEMBLY LOT CODE  
PART NUMBER  
DATE CODE  
YEAR 0 = 2000  
WEEK 02  
LINE C

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 10<sup>6</sup> 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					
20	T	Q	045	S	-
(1)	(2)	(3)	(4)	(5)	(6)

<b>1</b>	-	Current Rating (20 = 20A)
<b>2</b>	-	Package T = TO-220
<b>3</b>	-	Schottky "Q" Series
<b>4</b>	-	Voltage Ratings
<b>5</b>	-	<ul style="list-style-type: none"> <li>• none = TO-220</li> <li>• S = D<sup>2</sup>Pak</li> </ul>
<b>6</b>	-	<ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul>

035 = 35V  
 040 = 40V  
 045 = 45V

Tube Standard Pack Quantity : 50 pieces

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