International IƆR Rectifier

20L15T
20L15TS

SCHOTTKY RECTIFIER   20 Amps

$I_{F(AV)}$ = 20Amp
V_R = 15V

Major Ratings and Characteristics
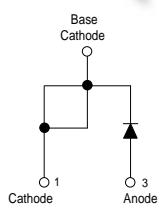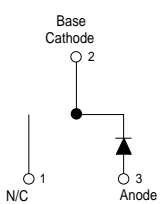
Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform	20	A
V_{RRM}		15	V
I_{FSM}	@ tp = 5 µs sine	700	A
V_F	@ 19 Apk, T_J=125°C (Typical)	0.25	V
T_J	range	- 55 to 125	°C

Description/ Features

The Schottky rectifier module has been optimized for ultra low forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary barrier technology allows for reliable operation up to 125 °C junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

- 125°C T_J operation (V_R < 5V)
- Single diode configuration
- Optimized for OR-ing applications
- Ultra low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance

Case Styles

20L15T	20L15TS
TO-220AC	D²PAK

International
IQR Rectifier

Voltage Ratings

Part number			Values
V_R	Max. DC Reverse Voltage (V)	@ T_J = 100 °C	15
V_{RWM}	Max. Working Peak Reverse Voltage (V) @ T_J = 100 °C		

Absolute Maximum Ratings

	Parameters	Values	Units	Conditions	
$I_{F(AV)}$	Max. Average Forward Current *See Fig. 5	20	A	50% duty cycle @ T_C = 85°C, rectangular wave form	
I_{FSM}	Max. Peak One Cycle Non-Repetitive Surge Current *See Fig. 7	700	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
		330		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repetitive Avalanche Energy	10	mJ	T_J = 25 °C, I_{AS} = 2 Amps, L = 6 mH	
I_{AR}	Repetitive Avalanche Current	2	A	Current decaying linearly to zero in 1 µsec Frequency limited by T_J max. V_A = 1.5 x V_R typical	

Electrical Specifications

	Parameters		Values		Units	Conditions	
			Typ.	Max.			
V_{FM}	Forward Voltage Drop *See Fig. 1 (1)		-	0.41	V	@ 19A	T_J = 25 °C
			-	0.52	V	@ 40A	
			0.25	0.33	V	@ 19A	T_J = 125 °C
			0.37	0.50	V	@ 40A	
I_{RM}	Reverse Leakage Current *See Fig. 2 (1)		-	10	mA	T_J = 25 °C	V_R = rated V_R
			-	600	mA	T_J = 100 °C	
$V_{F(TO)}$	Threshold Voltage		0.182		V	T_J = T_J max.	
r_t	Forward Slope Resistance		7.6		mΩ		
C_T	Max. Junction Capacitance		-	2000	pF	V_R = 5V_{DC}, (test signal range 100Khz to 1Mhz) 25°C	
L_S	Typical Series Inductance		8	-	nH	Measured lead to lead 5mm from package body	
dv/dt	Max. Voltage Rate of Change		10,000		V/ µs	(Rated V_R)	

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

Thermal-Mechanical Specifications

	Parameters		Values	Units	Conditions
T_J	Max. Junction Temperature Range		-55 to 125	°C	
T_{stg}	Max. Storage Temperature Range		-55 to 150	°C	
R_{thJC}	Max. Thermal Resistance Junction to Case		1.5	°C/W	DC operation *See Fig. 4
R_{thCS}	Typical Thermal Resistance Case to Heatsink		0.50	°C/W	Mounting surface, smooth and greased For TO-220
R_{thJA}	Max. Thermal Resistance Junction to Ambient		40	°C/W	DC operation For D²Pak
wt	Approximate Weight		2 (0.07)	g (oz.)	
T	Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)	Non-lubricated threads
		Max.	12 (10)		
	Marking Device		20L15T		Case Style TO-220
			20L15TS		Case Style D²Pak
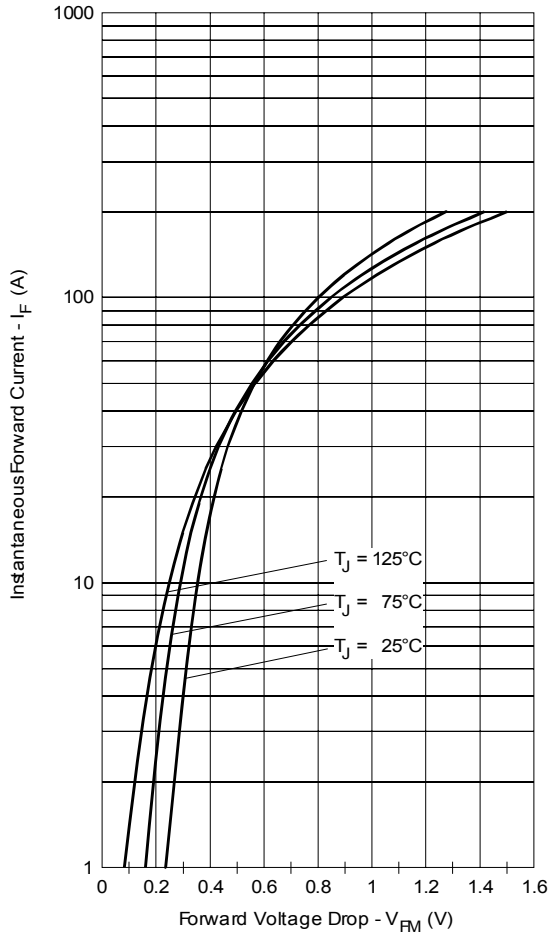
Fig. 1 - Maximum Forward Voltage Drop Characteristics
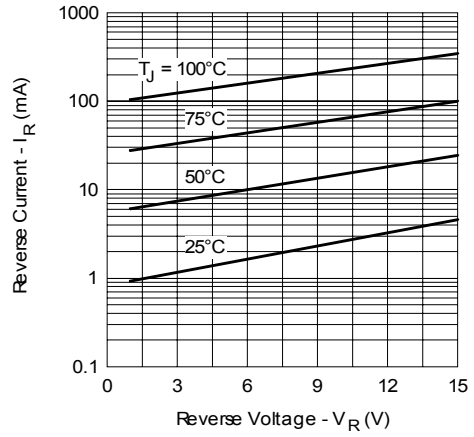
Fig. 2 - Typical Values of Reverse Current
Vs. Reverse Voltage
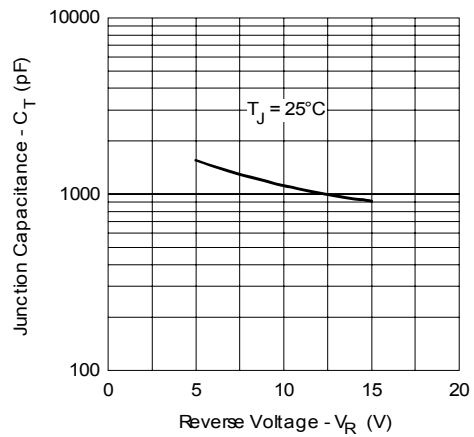
Fig. 3 - Typical Junction Capacitance
Vs. Reverse Voltage

Notes:

1. Duty factor $D = t_1 / t_2$

2. Peak $T_J = P_{DM} \times Z_{thJC} + T_C$
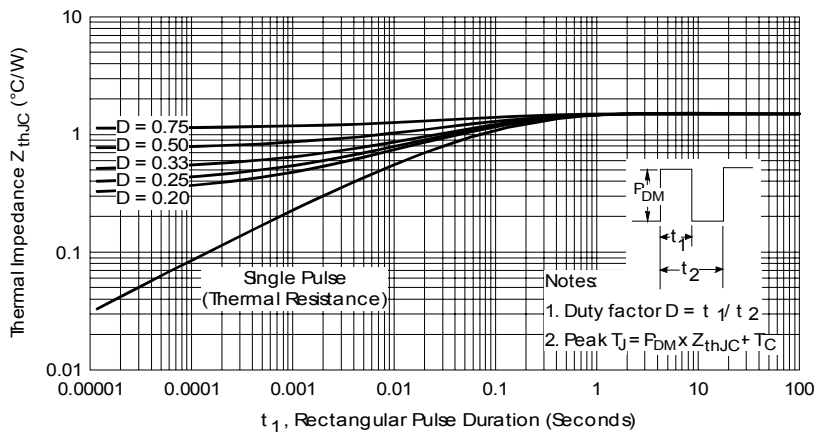
Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

International IGR Rectifier
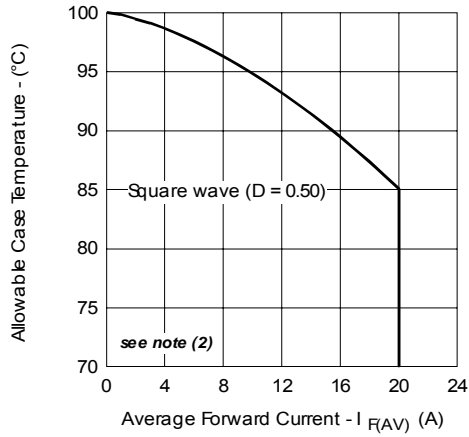
Fig. 5 - Maximum Allowable Case Temperature
Vs. Average Forward Current
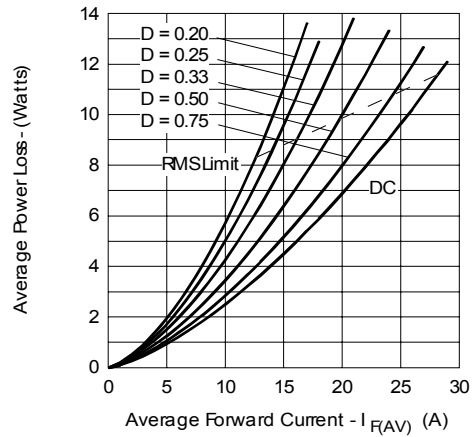
Fig. 6 - Forward Power Loss Characteristics
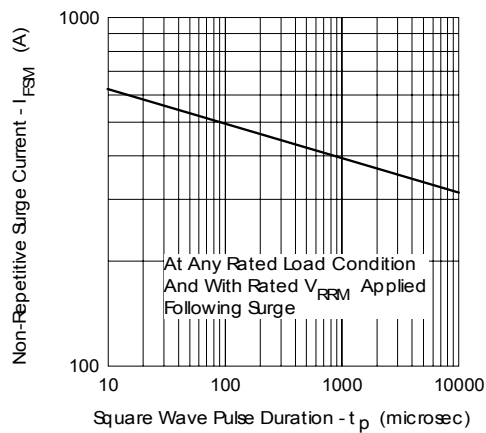
Fig. 7 - Maximum Non-Repetitive Surge Current
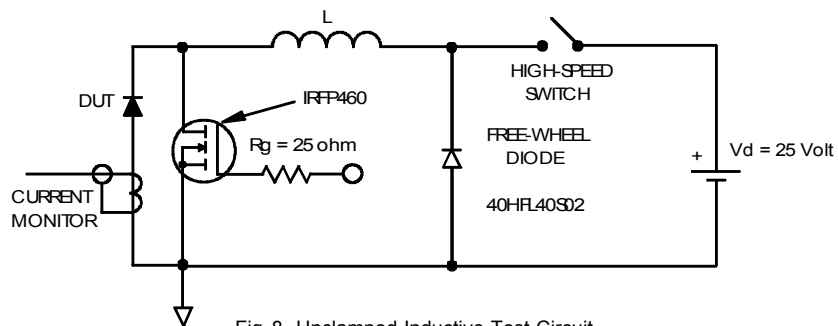
Fig. 8 - Unclamped Inductive Test Circuit

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

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

Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; I_R @ V_{R1} = 80% rated V_R

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 X H1 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	5.08 BSC		.200 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	3
øP	3.53	3.73	.139	.147	
Q	2.54	3.05	.100	.120	

LEAD ASSIGNMENTS
DIODES
1+2.- CATHODE
3.- ANODE

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"]
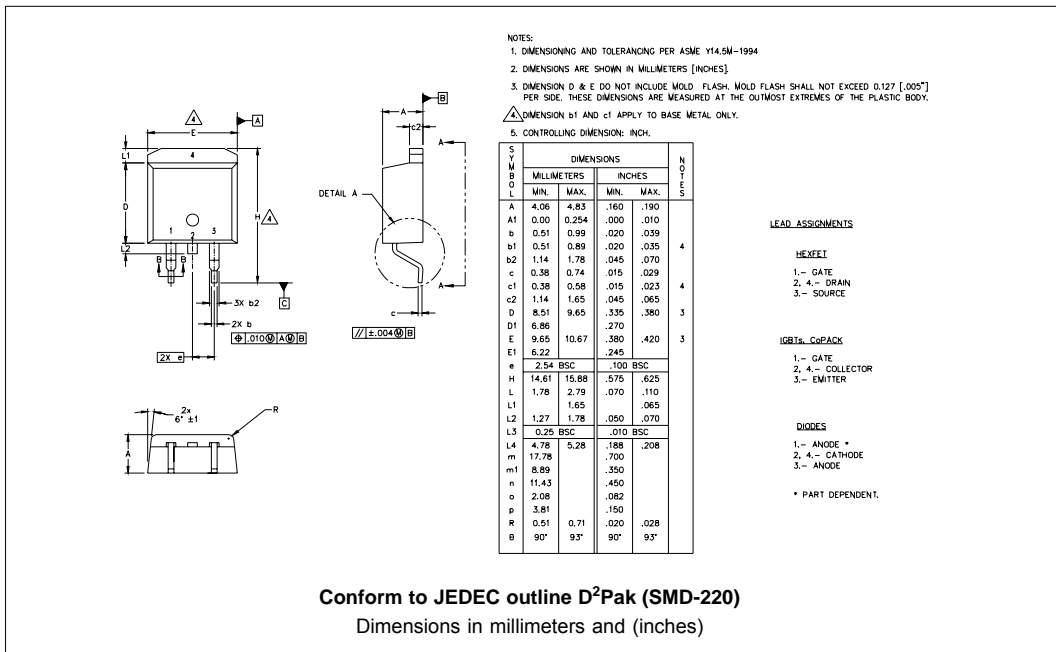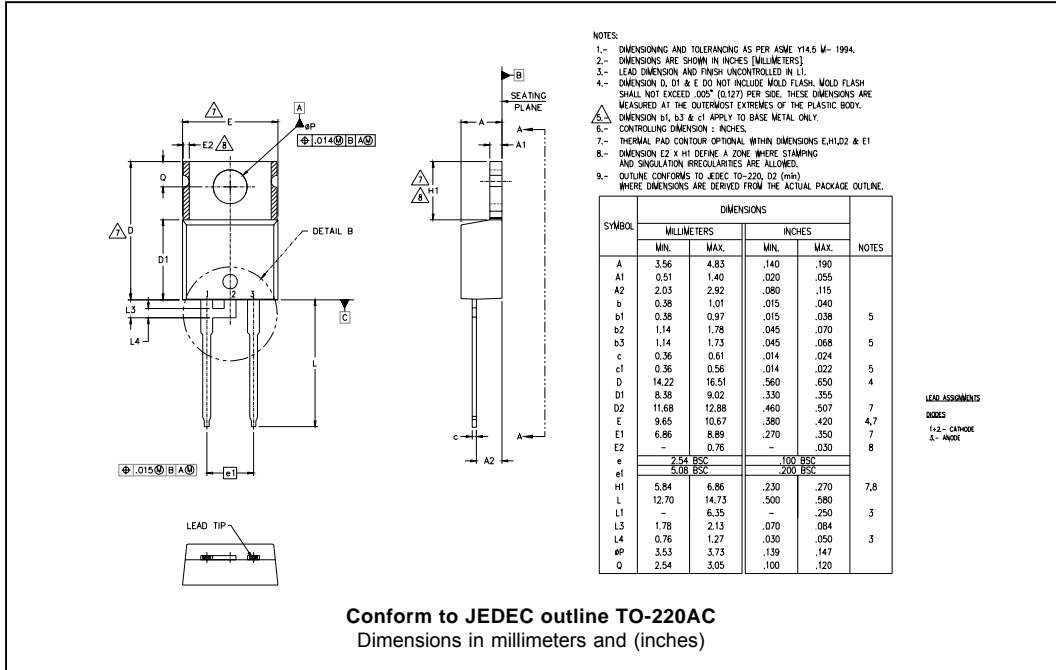PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
5. CONTROLLING DIMENSION: INCH.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
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.- 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)

Part Marking Information

TO-220AC

EXAMPLE: THIS IS A 20L15T
LOT CODE 1789
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "C"

PART NUMBER

INTERNATIONAL
RECTIFIER
LOGO

20L15T
I℞R 119C
17   89

ASSEMBLY
LOT CODE

DATE CODE

YEAR 1 = 2001
WEEK 19
LINE C

D²Pak

EXAMPLE: THIS IS A 20L15TS
LOT CODE 8024
ASSEMBLED ON WW 02, 2000

PART NUMBER

INTERNATIONAL
RECTIFIER
LOGO

20L15TS
I℞R 002C
80   24

ASSEMBLY
LOT CODE

DATE CODE

YEAR 0 = 2000
WEEK 02
LINE C

Tape & Reel Information

0.35±0.05

0.12 max

1.20

SECTION Y-Y

Ø1.55±0.05

P₂
2.0±0.1 Ⓒ
SEE NOTE 5

P₀
4.0±0.1 Ⓒ
SEE NOTE 1

Ⓒ
1.75±0.1

Ø1.6 ±0.1

R 0.3
Typical

2.17±0.1

1.57±0.1

F Ⓒ

SEE NOTE 5

W

B2
Bo

Ko Ⓒ

Y

Y

P₁

Ao Ⓒ

NOTES:
1.0 10 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

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

Dimensions in millimeters and (inches)

International IℛR Rectifier

20L15T, 20L15TS
Bulletin PD-20577 rev. E 06/06

Ordering Information Table

Device Code	20	L	15	T	-
	(1)	(2)	(3)	(4)	(5)

1 - Current Rating (20 = 20A)

2 - Schottky "L" Series

3 - Voltage Code (15 = 15V)

4 - Package

   T = TO-220

5 - • none = Standard Production

   • PbF = Lead-Free

Tube Standard Pack Quantity : 50 pieces

International IℛR Rectifier