



# MURB1020CTPbF MURB1020CT-1PbF

## Ultrafast Rectifier

### Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" suffix)

$t_{rr} = 25ns$
$I_{F(AV)} = 10Amp$
$V_R = 200V$

### Description/Applications

International Rectifier's MUR.. series are the state of the art Ultra fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time.

The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.


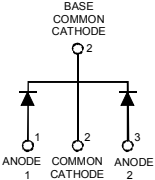

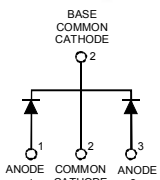
These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as free-wheeling diode in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

### Absolute Maximum Ratings

Parameters		Max	Units
$V_{RRM}$	Peak Repetitive Peak Reverse Voltage	200	V
$I_{F(AV)}$	Average Rectified Forward Current Per Leg	5	A
	Total Device, (Rated $V_R$ ), $T_C = 149^\circ C$	10	
$I_{FSM}$	Non Repetitive Peak Surge Current Per Leg	50	
$I_{FM}$	Peak Repetitive Forward Current Per Leg (Rated $V_R$ , Square wave, 20 KHz), $T_C = 149^\circ C$	10	
$T_J, T_{STG}$	Operating Junction and Storage Temperatures	- 65 to 175	$^\circ C$

### Case Styles

<p><b>MURB1020CTPbF</b></p>  <p>BASE COMMON CATHODE</p>  <p><b>D<sup>2</sup>PAK</b></p>	<p><b>MURB1020CT-1PbF</b></p>  <p>BASE COMMON CATHODE</p>  <p><b>TO-262</b></p>
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**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
V <sub>BR</sub> , V <sub>r</sub> Breakdown Voltage, Blocking Voltage	200	-	-	V	I <sub>R</sub> = 100μA
V <sub>F</sub> Forward Voltage	-	0.87	0.99	V	I <sub>F</sub> = 5A, T <sub>J</sub> = 125°C
	-	1.02	1.20	V	I <sub>F</sub> = 10A, T <sub>J</sub> = 125°C
	-	1.12	1.25	V	I <sub>F</sub> = 10A, T <sub>J</sub> = 25°C
I <sub>R</sub> Reverse Leakage Current	-	-	10	μA	V <sub>R</sub> = V <sub>R</sub> Rated
	-	-	250	μA	T <sub>J</sub> = 150°C, V <sub>R</sub> = V <sub>R</sub> Rated
C <sub>T</sub> Junction Capacitance	-	8	-	pF	V <sub>R</sub> = 200V
L <sub>S</sub> Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

**Dynamic Recovery Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions	
t <sub>rr</sub> Reverse Recovery Time	-	-	35	ns	I <sub>F</sub> = 1.0A, di <sub>F</sub> /dt = 50A/μs, V <sub>R</sub> = 30V	
	-	-	25		I <sub>F</sub> = 0.5A, I <sub>R</sub> = 1.0A, I <sub>REC</sub> = 0.25A	
	-	24	-	A	T <sub>J</sub> = 25°C	
	-	35	-		T <sub>J</sub> = 125°C	
I <sub>RRM</sub> Peak Recovery Current	-	3.3	-	T <sub>J</sub> = 25°C	I <sub>F</sub> = 5A V <sub>R</sub> = 160V di <sub>F</sub> /dt = 200A/μs	
	-	5.0	-	T <sub>J</sub> = 125°C		
Q <sub>rr</sub> Reverse Recovery Charge	-	33	-	nC		T <sub>J</sub> = 25°C
	-	76	-	nC		T <sub>J</sub> = 125°C

**Thermal - Mechanical Characteristics**

Parameters	Min	Typ	Max	Units
T <sub>J</sub> Max. Junction Temperature Range	- 65	-	175	°C
T <sub>Stg</sub> Max. Storage Temperature Range	- 65	-	175	
R <sub>thJC</sub> Thermal Resistance, Junction to Case Per Leg	-	-	5	°C/W
R <sub>thJA</sub> Thermal Resistance, Junction to Ambient Per Leg	-	-	50	
R <sub>thCS</sub> <sup>①</sup> Thermal Resistance, Case to Heatsink	-	0.5	-	
Wt Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in
Marking Device	MURB1020CT		Case style D <sup>2</sup> Pak	
	MURB1020CT-1		Case style TO-262	

① Mounting Surface, Flat, Smooth and Greased

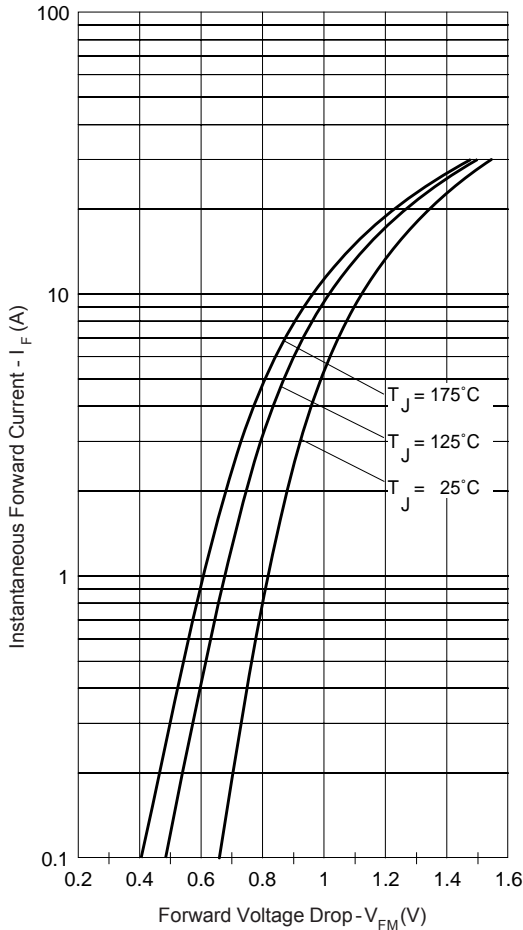


Fig. 1 - Typical Forward Voltage Drop Characteristics

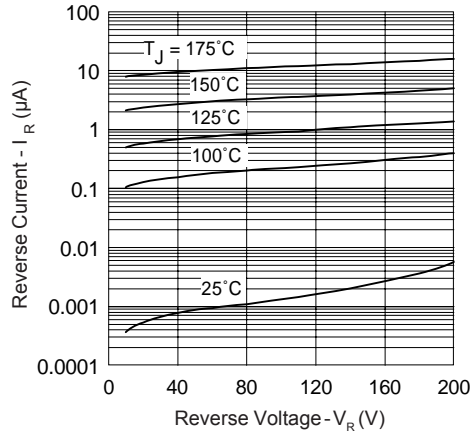


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

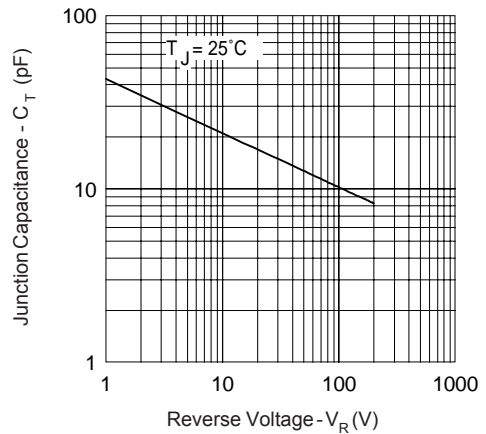


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

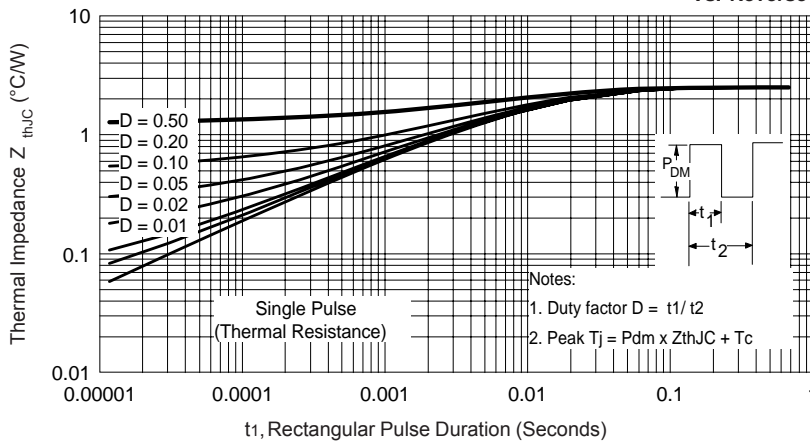
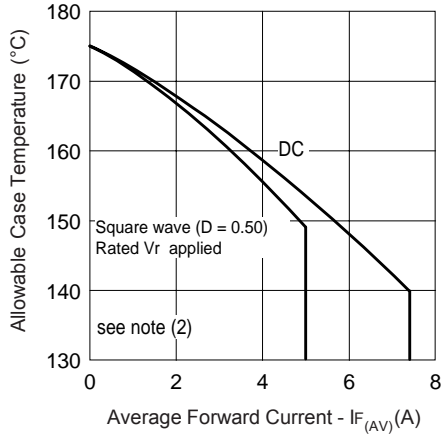
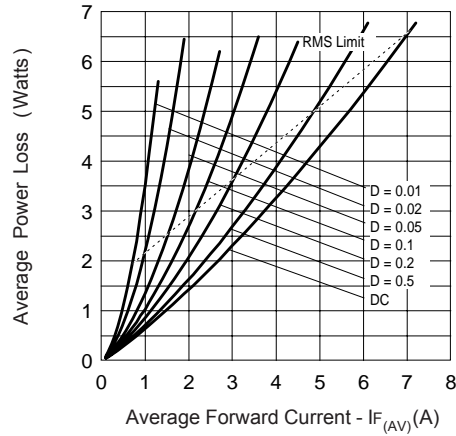


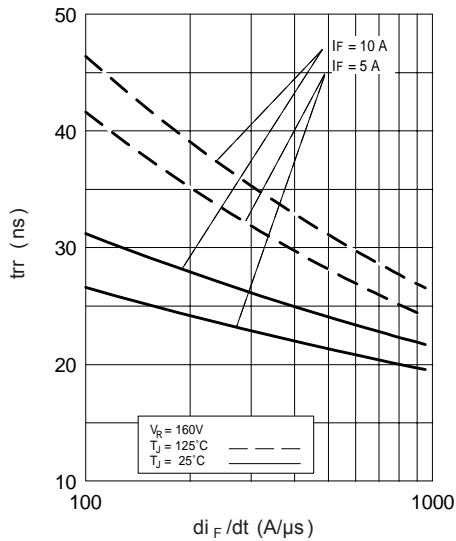
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



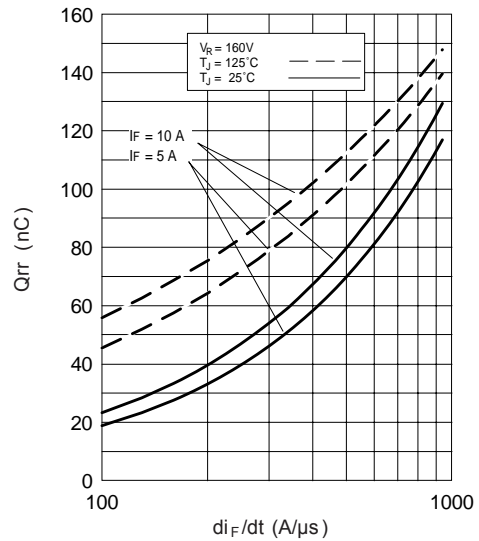
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



**Fig. 6 - Forward Power Loss Characteristics**



**Fig. 7 - Typical Reverse Recovery vs.  $di_F/dt$**



**Fig. 8 - Typical Stored Charge vs.  $di_F/dt$**

(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 =  $V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_{R1}$  = rated  $V_R$

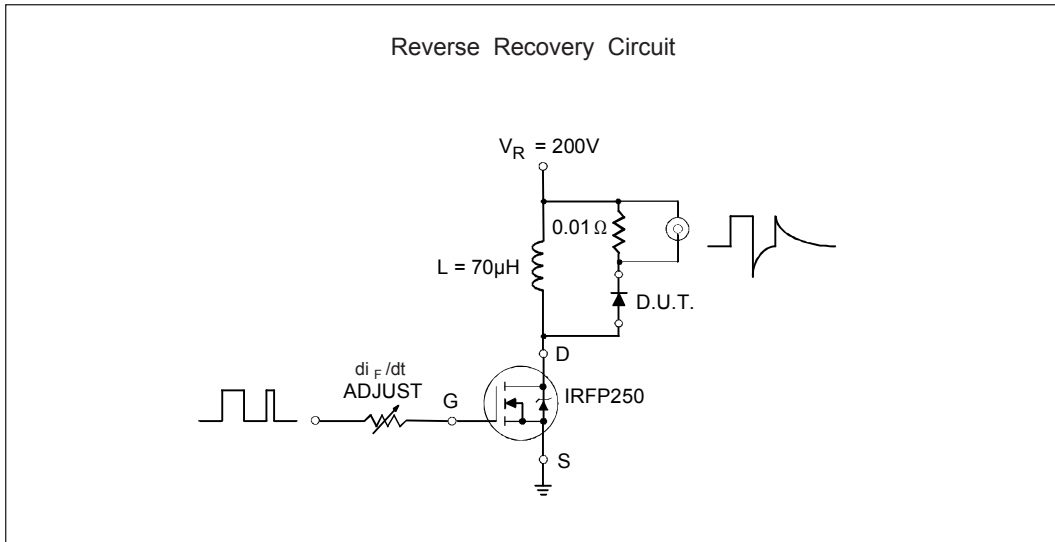


Fig. 9- Reverse Recovery Parameter Test Circuit

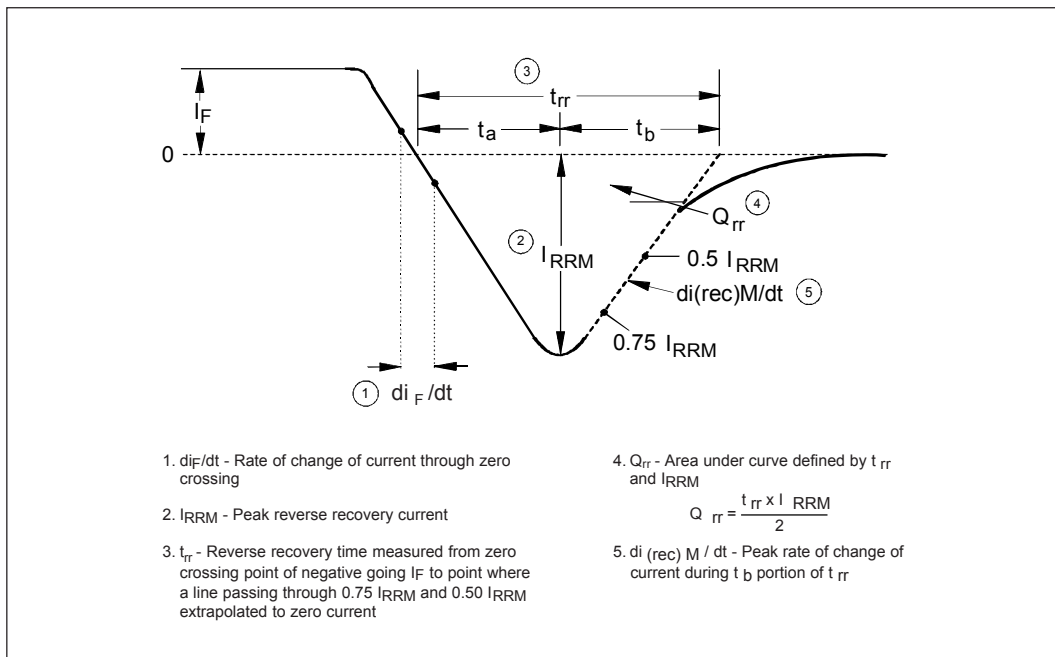


Fig. 10 - Reverse Recovery Waveform and Definitions

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	
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	
φ	90°	93°	90°	93°	

LEAD ASSIGNMENTS  
 HEXFET  
 1.- GATE  
 2, 4.- DRAIN  
 3.- SOURCE  
 IGBTs, CoPACK  
 1.- GATE  
 2.- COLLECTOR  
 3.- EMITTER  
 DIODES  
 1.- ANODE +  
 2.- CATHODE  
 3.- ANODE  
 \* PART DEPENDENT.

**Conform to JEDEC outline D<sup>2</sup>Pak (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	
A1	2.03	3.02	.080	.119	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	-	.270	-	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	-	.245	-	4
e	2.54 BSC		.100 BSC		
L	13.46	14.10	.530	.555	
L1	-	1.65	-	.065	4
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

**D<sup>2</sup>PAK**

EXAMPLE: THIS IS A MURB1020CT  
 LOT CODE 8024  
 ASSEMBLED ON WW 02, 2000

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

INTERNATIONAL RECTIFIER LOGO  
 ASSEMBLY LOT CODE  
 PART NUMBER  
 DATE CODE  
 YEAR 0 = 2000  
 WEEK 02  
 P = LEAD-FREE

**TO-262**

EXAMPLE: THIS IS A MURB1020CT-1  
 LOT CODE 8024  
 ASSEMBLED ON WW 02, 2000

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

INTERNATIONAL RECTIFIER LOGO  
 ASSEMBLY LOT CODE  
 PART NUMBER  
 DATE CODE  
 YEAR 0 = 2000  
 WEEK 02  
 P = 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 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 K<sub>0</sub> 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																	
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">MUR</td> <td style="padding: 5px;">B</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">20</td> <td style="padding: 5px;">CT</td> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">TRL</td> <td style="padding: 5px;">P</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>	MUR	B	10	20	CT	-1	TRL	P	①	②	③	④	⑤	⑥	⑦	⑧
MUR	B	10	20	CT	-1	TRL	P										
①	②	③	④	⑤	⑥	⑦	⑧										
<b>1</b>	- Ultrafast MUR Series																
<b>2</b>	- B = D <sup>2</sup> Pak/ TO-262																
<b>3</b>	- Current Rating (10 = 10A)																
<b>4</b>	- Voltage Rating (20 = 200V)																
<b>5</b>	- CT = Center Tap (Dual)																
<b>6</b>	<ul style="list-style-type: none"> <li>• none = D<sup>2</sup>Pak</li> <li>• -1 = TO-262</li> </ul>																
<b>7</b>	<ul style="list-style-type: none"> <li>• none = Tube (50 pieces)</li> <li>• TRL = Tape &amp; Reel (Left Oriented - for D<sup>2</sup>Pak only)</li> <li>• TRR = Tape &amp; Reel (Right Oriented - for D<sup>2</sup>Pak only)</li> </ul>																
<b>8</b>	<ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free (for TO-262 and D<sup>2</sup>Pak tube)</li> <li>• P = Lead-Free (for D<sup>2</sup>Pak TRR and TRL)</li> </ul>																

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.





## Notice

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