

Bulletin PD-20051 rev. A 09/01

International
IR Rectifier

MBR4045CT
MBRB4045CT
MBR4045CT-1

SCHOTTKY RECTIFIER

40 Amp

Major Ratings and Characteristics

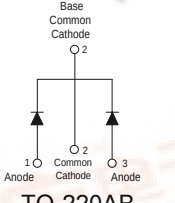
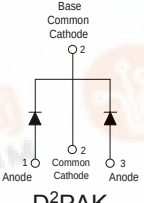
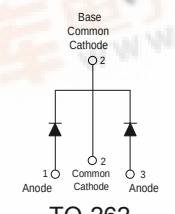
Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform (Per Device)	40	A
I_{FRM} @ $T_C = 118^{\circ}C$ (Per Leg)	40	A
V_{RRM}	45	V
I_{FSM} @ $t_p = 5 \mu s$ sine	900	A
V_F @ 20 Apk, $T_J = 125^{\circ}C$	0.58	V
T_J range	-65 to 150	$^{\circ}C$

Description/Features

This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to $150^{\circ}C$ junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- $150^{\circ}C$ T_J operation
- Center tap TO-220, D²Pak and TO-262 packages
- 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

Case Styles

MBR4045CT	MBRB4045CT	MBR4045CT-1
  TO-220AB	  D ² PAK	  TO-262



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Voltage Ratings

Parameters	MBR4045CT MBRB4045CT MBR4045CT-1
V_R Max. DC Reverse Voltage (V)	45
V_{RWM} Max. Working Peak Reverse Voltage (V)	

Absolute Maximum Ratings

Parameters	Values	Units	Conditions
$I_{F(AV)}$ Max. Average Forward (PerLeg) Current (Per Device)	20 40	A	@ $T_C = 118^\circ\text{C}$, (Rated V_R)
I_{FRM} Peak Repetitive Forward Current (Per Leg)	40	A	Rated V_R , square wave, 20kHz $T_C = 118^\circ\text{C}$
I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg)	900 210	A	5 μs Sine or 3 μs Rect. pulse 10ms Sine or 6ms Rect. pulse Following any rated load condition and with rated V_{RRM} applied
E_{AS} Non-Repetitive Avalanche Energy (Per Leg)	20	A	$T_J = 25^\circ\text{C}$, $I_{AS} = 3\text{Amps}$, $L = 4.40\text{mH}$
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 (1)	0.60 0.78 0.58 0.75	V	@ 20A @ 40A @ 20A @ 40A $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
I_{RM} Max. Instantaneous Reverse Current (1)	1 50 95	mA	$T_J = 25^\circ\text{C}$ $T_J = 100^\circ\text{C}$ $T_J = 125^\circ\text{C}$ Rated DC voltage
C_T Max. Junction Capacitance	900	pF	$V_R = 5V_{DC}$, (test signal range 100Khz to 1Mhz) 25°C
L_S Typical Series Inductance	8.0	nH	Measured from top of terminal to mounting plane
dv/dt Max. Voltage Rate of Change (Rated V_R)	10,000	V/ μs	

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

Thermal-Mechanical Specifications

Parameters	Values	Units	Conditions
T_J Max. Junction Temperature Range	-65 to 150	$^\circ\text{C}$	
T_{stg} Max. Storage Temperature Range	-65 to 175	$^\circ\text{C}$	
R_{thJC} Max. Thermal Resistance Junction to Case (Per Leg)	1.5	$^\circ\text{C/W}$	DC operation
R_{thCS} Typical Thermal Resistance Case to Heatsink	0.50	$^\circ\text{C/W}$	Mounting surface, smooth and greased Only for TO-220
R_{thJA} Max. Thermal Resistance Junction to Ambient	50	$^\circ\text{C/W}$	DC operation For D2Pak and TO-262
wt Approximate Weight	2 (0.07)	g (oz.)	
T Mounting Torque	Min. 6 (5) Max. 12 (10)	Kg-cm (lbf-in)	Non-lubricated threads

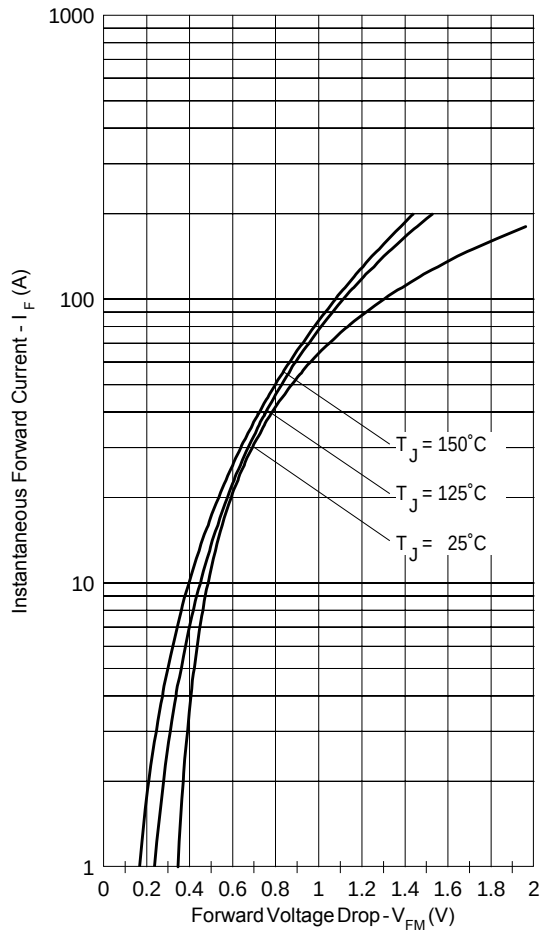


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

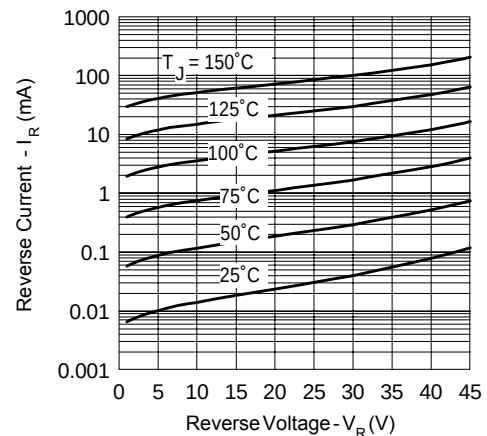


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

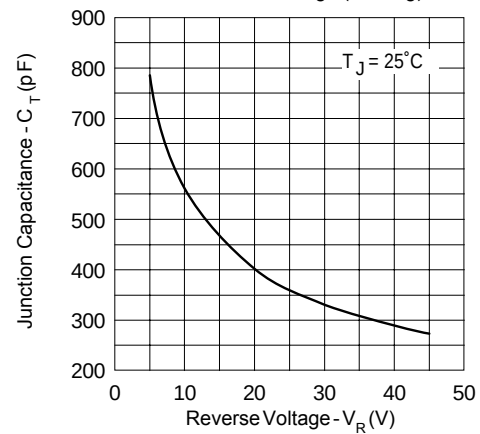


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

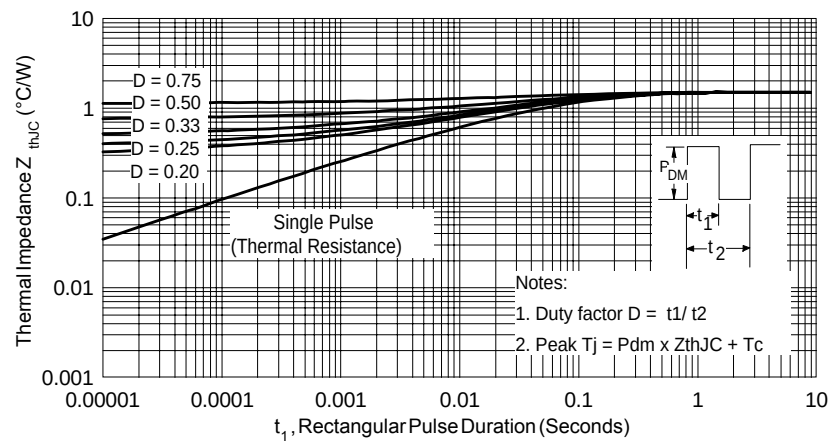


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

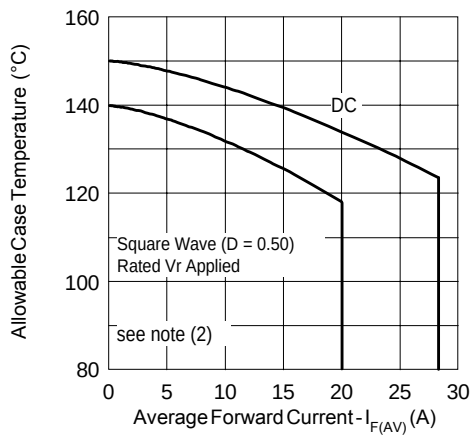


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

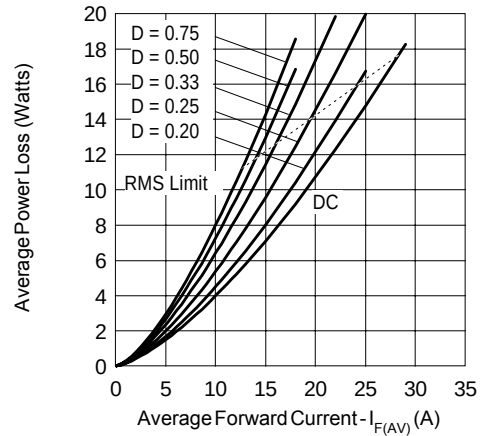


Fig. 6 - Forward Power Loss Characteristics

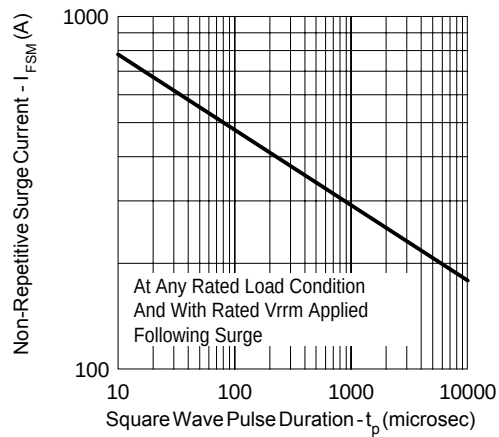


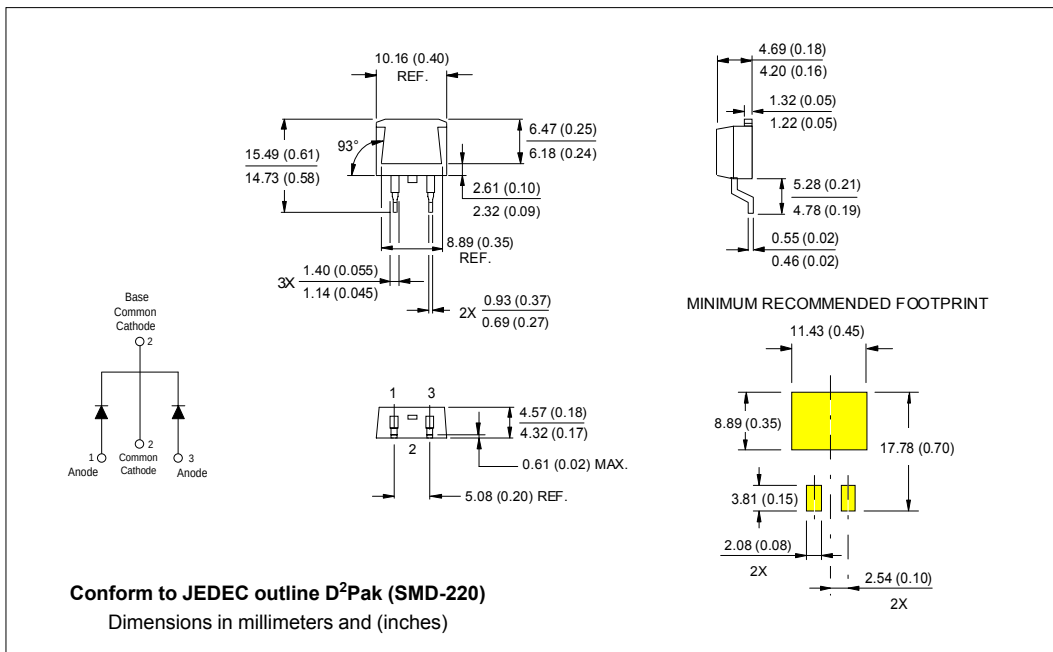
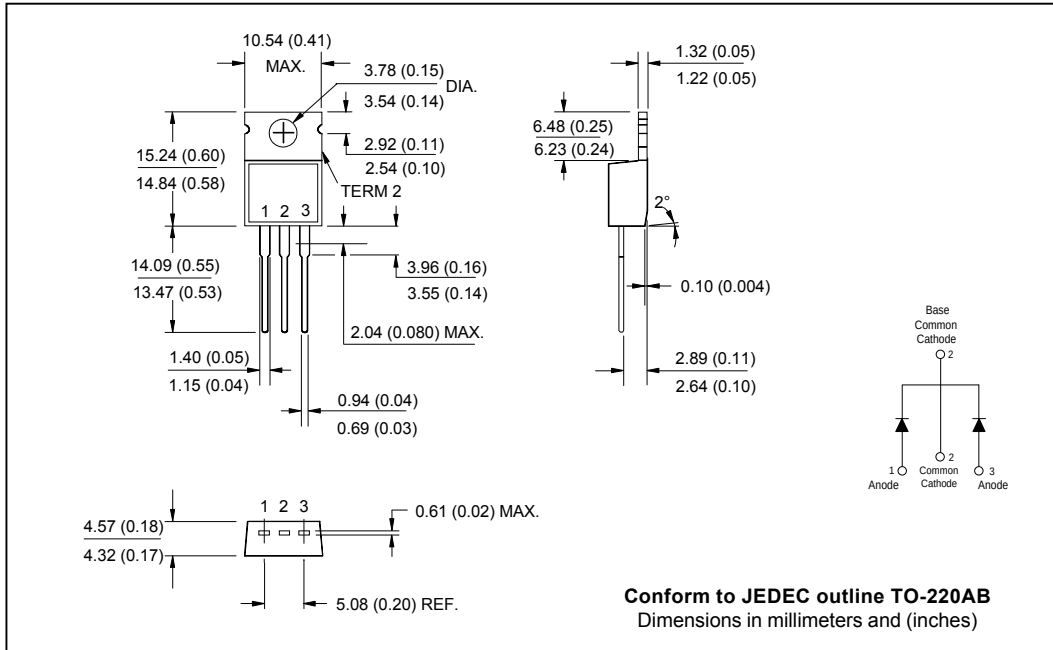
Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

(2) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$

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

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

Outline Table

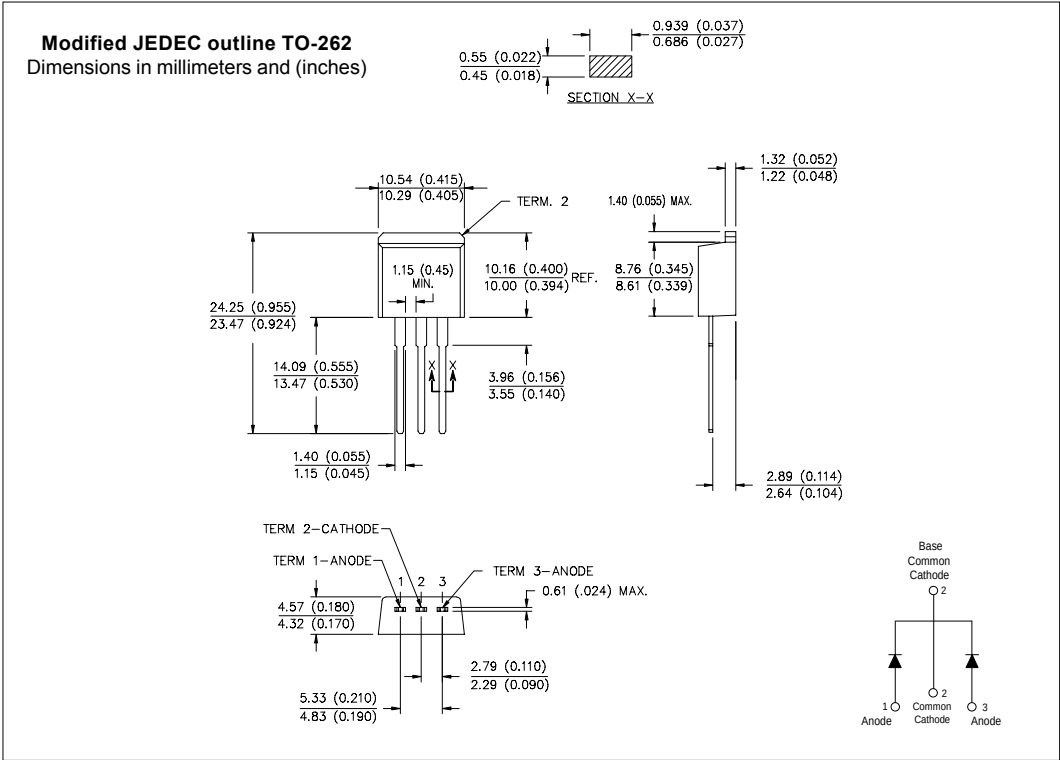


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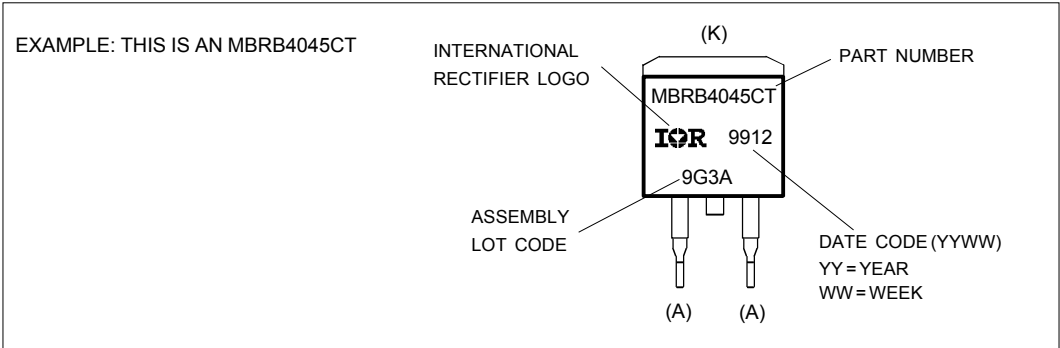
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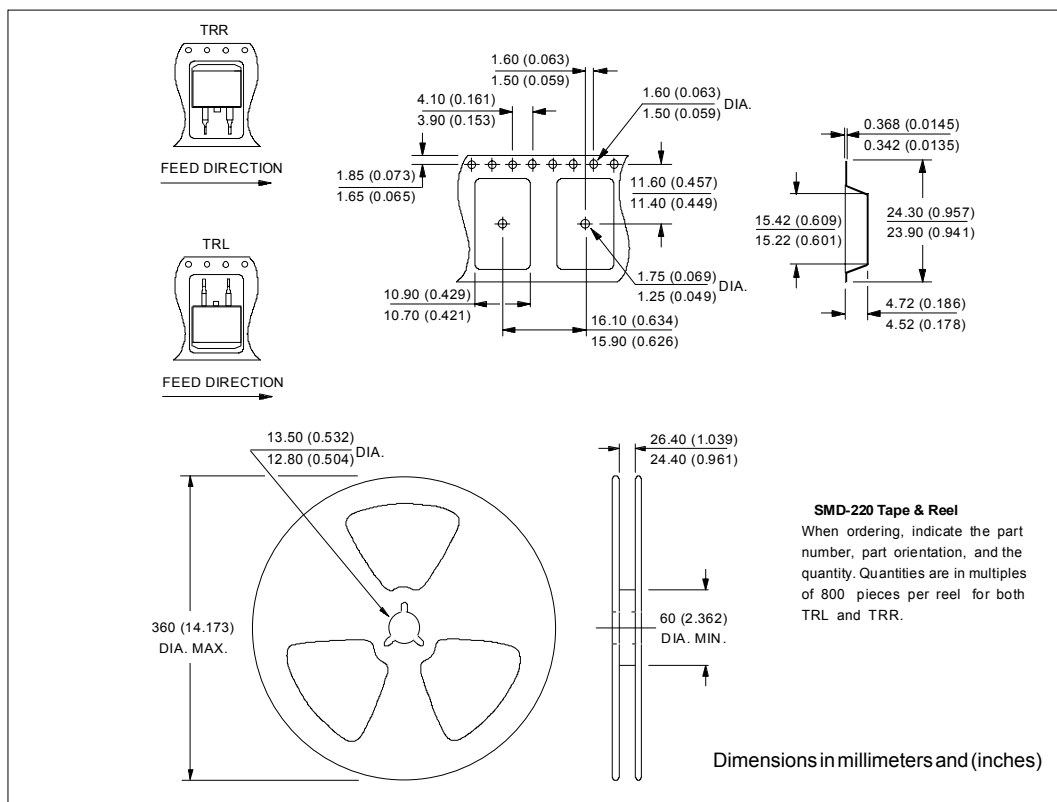
Outline Table



Marking Information



Tape & Reel Information



Ordering Information Table

Device Code					
MBR	B	40	45	CT	-1
1	2	3	4	5	6
1	Essential Part Number				
2	Package Style: none = TO-220 B = D ² Pak				
3	Current Rating: 40 = 40A				
4	Voltage code: Code = V _{RRM}				
5	Circuit configuration (Center Tap - Dual)				
6	-1 = TO-262 option				

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MBR4045CT
*****
*      This model has been developed by      *
*      Wizard SPICE MODEL GENERATOR (1999)  *
*      (International Rectifier Corporation) *
*      Contains proprietary Information      *
*****
* SPICE Model Diode is composed by a      *
* simple diode plus paralalled VCG2T      *
*****
.SUBCKT MBR4045CT ANO CAT
D1 ANO 1 DMOD (0.07089)
*Define diode model
.MODEL DMOD D(IS=1.41031849705903E-04A,N=1.12223892649545,BV=49V,
+ IBV=0.267178064395486A,RS= 0.000581298,CJO=2.94926944579954E-08,
+ VJ=0.779269989906853,XTI=2, EG=0.730300626417364)
*****
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=19.7716341798827)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP(((( -2.531689E-03/19.77164)*((V(2,CAT)*1E6)/
(I(VX)+1E-6)-1))+1)*6.454822E-02*ABS(V(ANO,CAT)))-1)}
*****
.ENDS MBR4045CT

Thermal Model Subcircuit
.SUBCKT MBR4045CT 5 1

CTHERM1      5      4      1.84E+00
CTHERM2      4      3      1.74E+01
CTHERM3      3      2      9.36E+01
CTHERM4      2      1      1.30E+03

R THERM1      5      4      4.55E-01
R THERM2      4      3      5.76E-01
R THERM1      3      2      3.12E-01
R THERM1      2      1      1.49E-01

.ENDS MBR4045CT
    
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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.

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