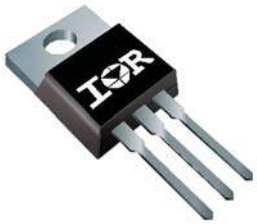
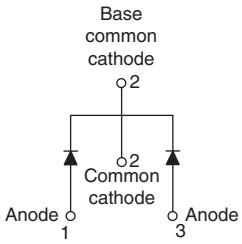
Schottky Rectifier



TO-220



FEATURES

- 150 °C T_J operation
- Center tap TO-220, D^2PAK 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
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level

PRODUCT SUMMARY	
$I_{F(AV)}$	20 A
V_R	80/100 V

DESCRIPTION

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 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform per device	20	A
I_{FRM}	at T_C = 133 °C per leg	20	A
V_{RRM}		80/100	V
I_{FSM}	at t_p = 5 µs sine	850	A
V_F	at 10 Apk, T_J = 125 °C	0.70	V
T_J	Range	- 65 to 150	°C

VOLTAGE RATINGS					
PARAMETER	SYMBOL	MBR2080CTPbF	MBR2090CTPbF	MBR20100CTPbF	UNITS
Maximum DC reverse voltage	V_R	80	90	100	V
Maximum working peak reverse voltage	V_{RWM}				

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current	per leg	$I_{F(AV)}$	at T_C = 133 °C, (rated V_R)		10	A
	per device				20	
Peak repetitive forward current per leg		I_{FRM}	Rated V_R, square wave, 20 kHz, T_C = 133 °C		20	
Non-repetitive peak surge current		I_{FSM}	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	850	
			Surge applied at rated load conditions halfwave, single phase, 60 Hz		150	
Peak repetitive reverse surge current		I_{RRM}	2.0 µs, 1.0 kHz		0.5	
Non-repetitive avalanche energy per leg		E_{AS}	T_J = 25 °C, I_{AS} = 2 A, L = 12 mH		24	mJ

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	V_{FM} (1)	at 10 A	T_J = 25 °C	0.80	V
		at 20 A		0.95	
		at 10 A	T_J = 125 °C	0.70	
		at 20 A		0.85	
Maximum instantaneous reverse current	I_{RM} (1)	T_J = 25 °C	Rated DC voltage	0.10	mA
		T_J = 125 °C		6	
Threshold voltage	$V_{F(TO)}$	T_J = T_J maximum		0.433	V
Forward slope resistance	r_t			15.8	mΩ
Maximum junction capacitance	C_T	V_R = 5 V_{DC} (test signal range 100 kHz to 1 MHz) 25 °C		400	pF
Typical series inductance	L_S	Measured from top of terminal to mounting plane		8.0	nH
Maximum voltage rate of change	dv/dt	(Rated V_R)		10 000	V/µs

Note

(1) Pulse width < 300 µs, duty cycle < 2 %

THERMAL - MECHANICAL CHARACTERISTICS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction temperature range		T_J		- 65 to 150	°C
Maximum storage temperature range		T_{Stg}		- 65 to 175	
Maximum thermal resistance, junction to case per leg		R_{thJC}	DC operation	2.0	°C/W
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased only for TO-220	0.50	
Maximum thermal resistance, junction to ambient		R_{thJA}	DC operation for D^2PAK and TO-262	50	
Approximate weight				2	g
				0.07	(oz)
Mounting torque	minimum			6 (5)	kg-cm (lbf · in)
	maximum			12 (10)	
Marking device				MBR20100CT	

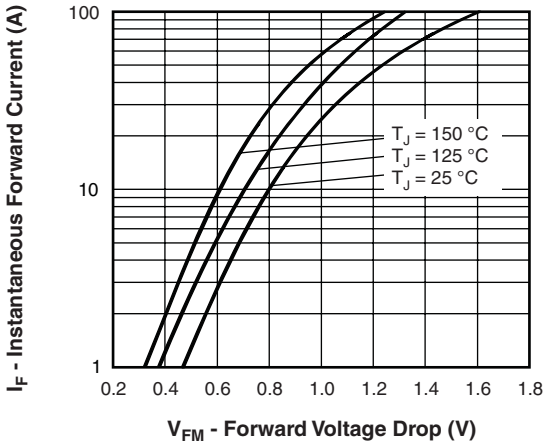


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

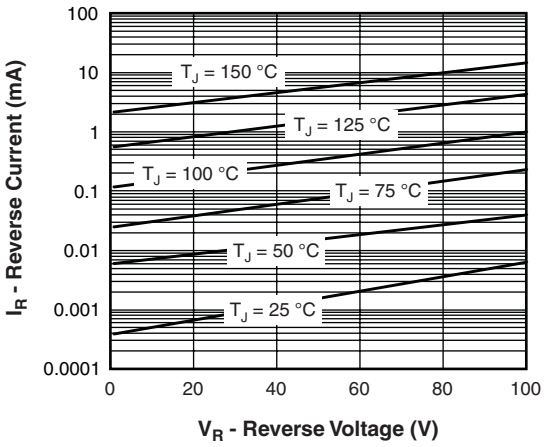


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

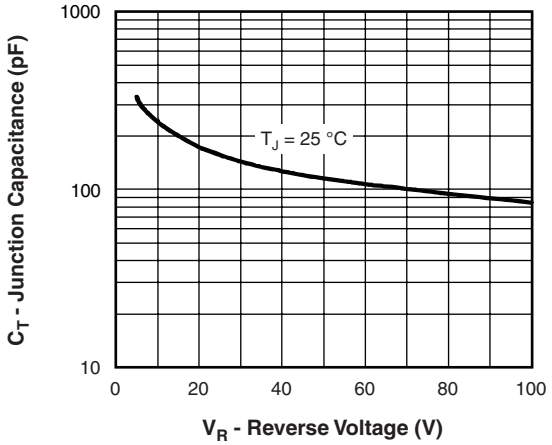


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

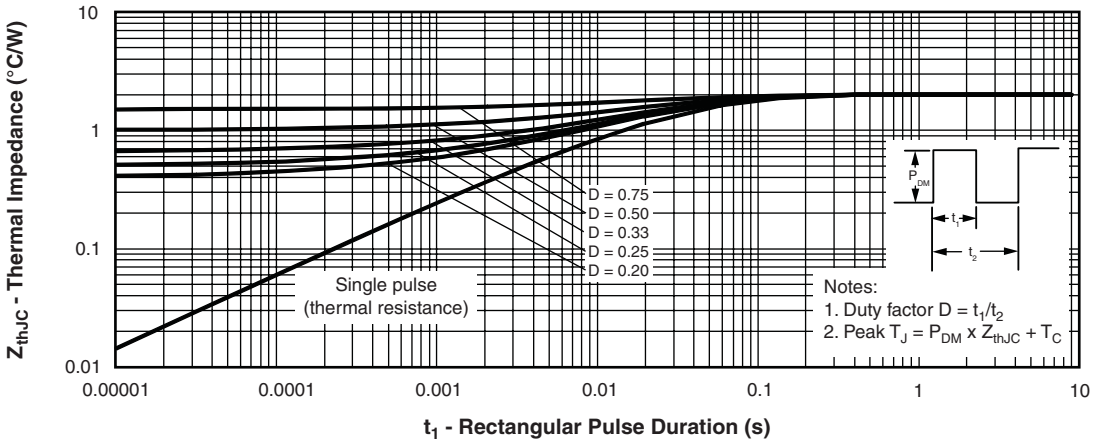


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

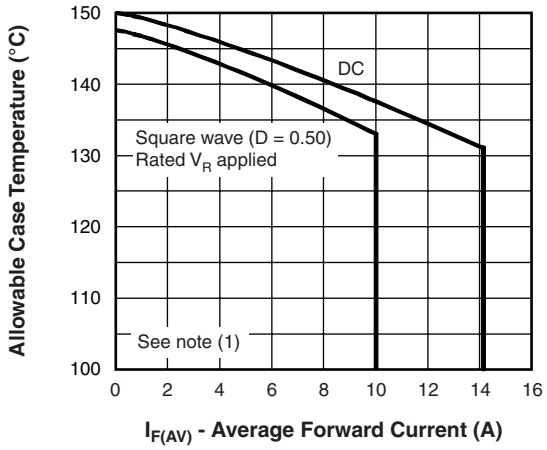


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

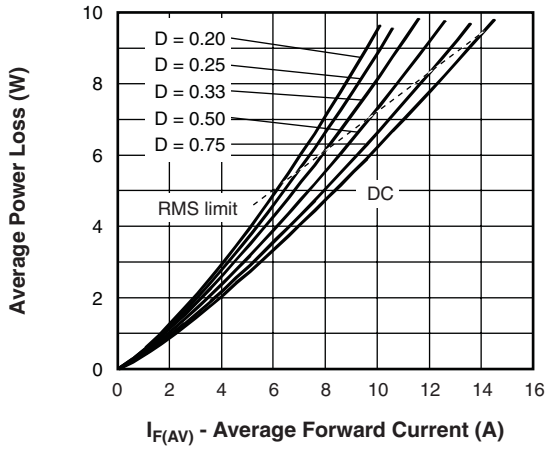


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

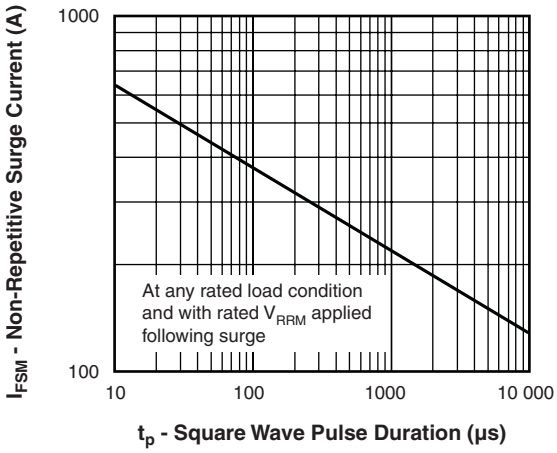
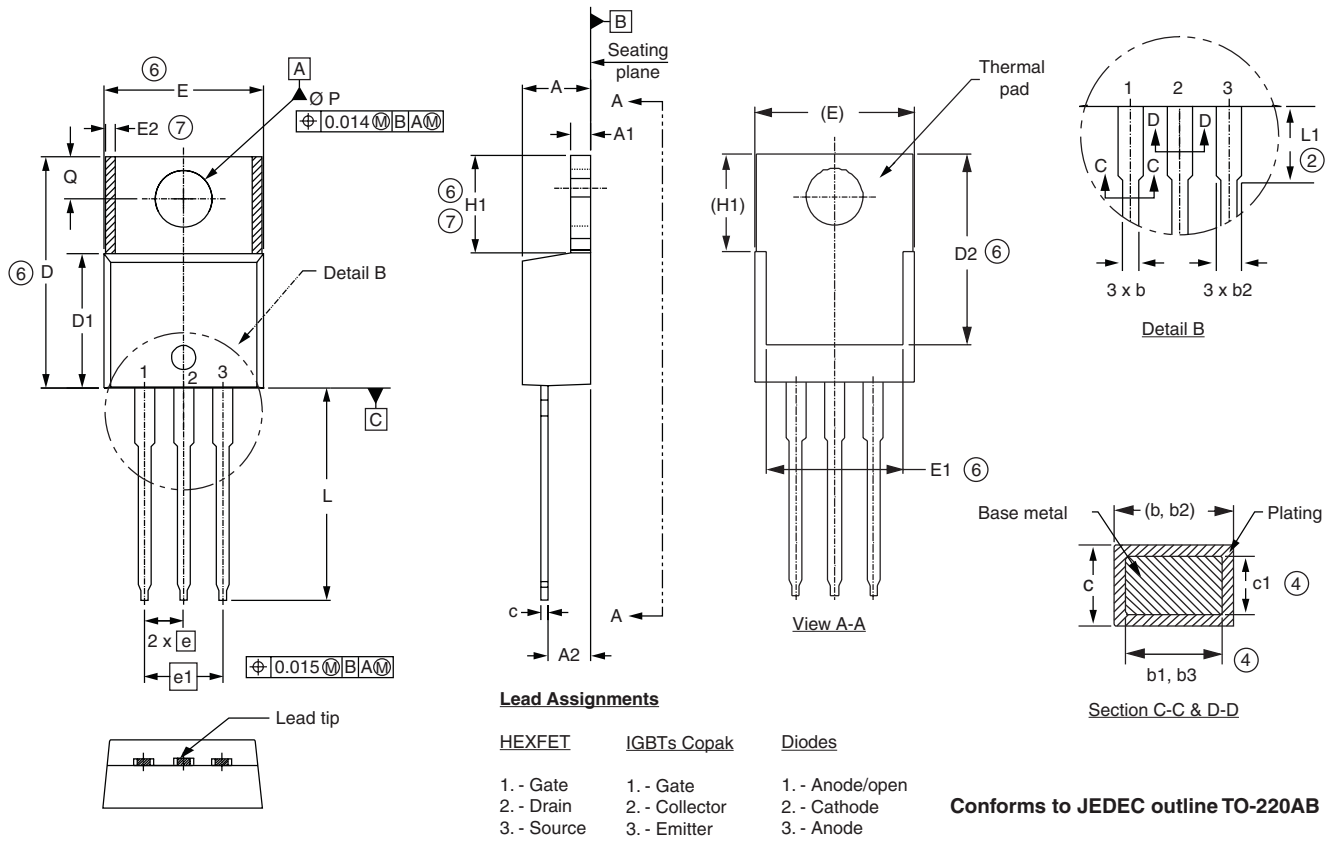


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6);
Pd_{REV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

OUTLINE DIMENSIONS in millimeters (inches)



Lead Assignments

HEXFET	IGBTs Copak	Diodes
1. - Gate	1. - Gate	1. - Anode/open
2. - Drain	2. - Collector	2. - Cathode
3. - Source	3. - Emitter	3. - Anode

Conforms to JEDEC outline TO-220AB

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	0.140	0.190	
A1	0.51	1.40	0.020	0.055	
A2	2.03	2.92	0.080	0.115	
b	0.38	1.01	0.015	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.22	16.51	0.560	0.650	3
D1	8.38	9.02	0.330	0.355	

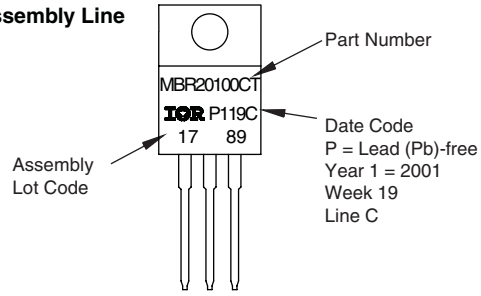
SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	11.68	12.88	0.460	0.507	6
E	9.65	10.67	0.380	0.420	3, 6
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.54 BSC		0.100 BSC		
e1	5.08 BSC		0.200 BSC		
H1	5.84	6.86	0.230	0.270	6, 7
L	12.70	14.73	0.500	0.580	
L1	-	6.35	-	0.250	2
Ø P	3.54	4.08	0.139	0.161	
Q	2.54	3.42	0.100	0.135	

Notes

1. Dimensioning and tolerancing as per ASME Y 14.5 M - 1994
2. Lead dimension and finish uncontrolled in L1
3. Dimension D, D1 and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
4. Dimension b1, b3 and c1 apply to base metal only
5. Controlling dimensions: inches
6. Thermal pad contour optional within dimensions E, H1, D2 and E1
7. Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed
8. Outline conforms to JEDEC TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline

PART MARKING INFORMATION

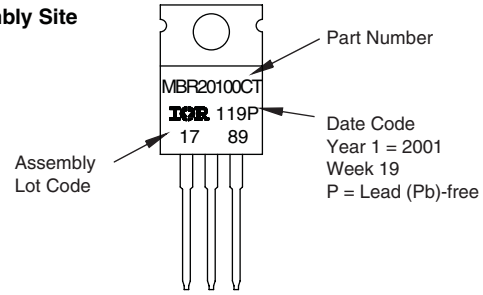
MAIN - SubCon Assembly Line



Example: This is a MBR20100CT with Assembly Lot Code 1789, assembled on WW 19, 2001 in the assembly line "C"

Note: "P" in the beginning of Date Code indicates "lead (Pb)-free"

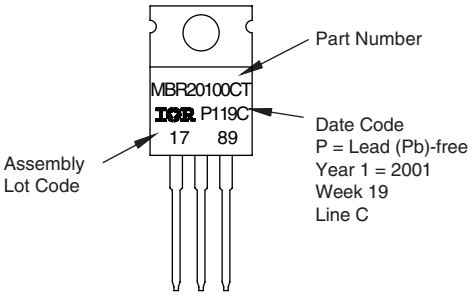
Alternative Assembly Site



Example: This is a MBR20100CT with Assembly Lot Code 1789, assembled on WW 19, 2001

Note: "P" in assembly line position indicates "lead (Pb)-free"

or:



Example: This is a MBR20100CT with Assembly Lot Code 1789, assembled on WW 19, 2001 in the assembly line "C"

Note: "P" in the beginning of Date Code indicates "lead (Pb)-free"

ORDERING INFORMATION TABLE

Device code

MBR	20	100	CT	PbF
1	2	3	4	5

- 1 - Schottky MBR series
- 2 - Current rating (20 = 20 A)
- 3 - Voltage ratings
  - 080 = 80 V
  - 090 = 90 V
  - 100 = 100 V
- 4 - CT = Essential part number
- 5 - • None = Standard production
  - • PbF = Lead (Pb)-free

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