

Switch-mode Schottky Power Rectifier 250 V, 40 A

MBR40250G, MBR40250TG, MBRF40250TG, MBRB40250TG

Features

- 250 V Blocking Voltage
- Low Forward Voltage Drop, $V_F = 0.86$ V
- Soft Recovery Characteristic, $T_{RR} < 35$ ns
- Stable Switching Performance Over Temperature
- These Devices are Pb-Free and are RoHS Compliant

Benefits

- Reduces or Eliminates Reverse Recovery Oscillations
- Minimizes Need for EMI Filtering
- Reduces Switching Losses
- Improved Efficiency

Applications

- Power Supply
- Power Management
- Automotive
- Instrumentation

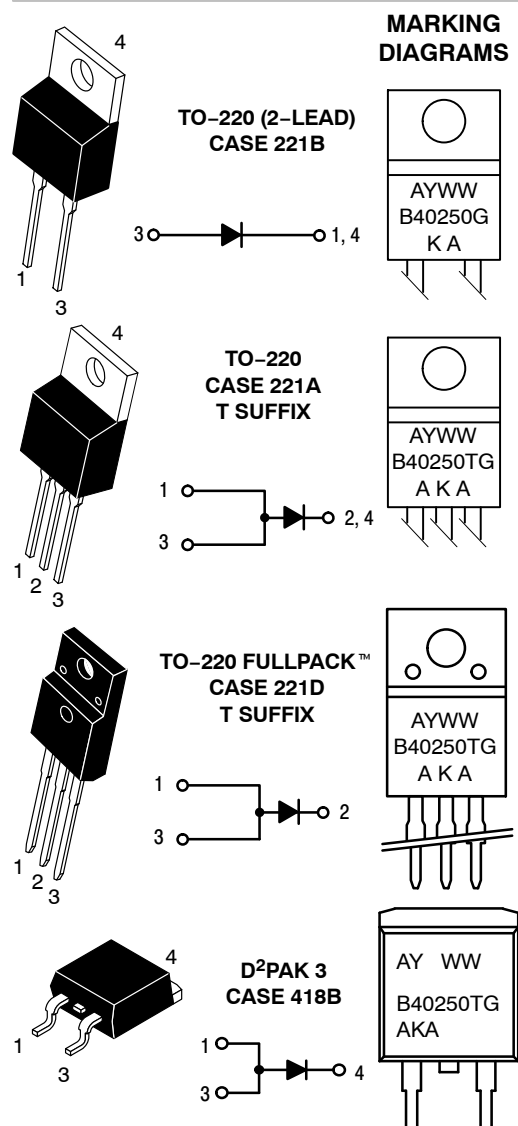
Mechanical Characteristics

- Case: Epoxy, Molded
- Weight: 1.9 grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:
260°C Max. for 10 Seconds
- Epoxy Meets UL 94 V-0 at 0.125 in



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B40250 = Device Code
 T = 3 pins
 A = Assembly Location
 Y = Year
 WW = Work Week
 G = Pb-Free Package
 KA, AKA = Polarity Designator

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

MBR40250G, MBR40250TG, MBRF40250TG, MBRB40250TG

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	250	V
Average Rectified Forward Current (Rated V_R) $T_C = 82^\circ\text{C}$ MBR40250, MBR40250T, MBRB40250T (Rated V_R) $T_C = 46^\circ\text{C}$ MBRF40250T	$I_{F(AV)}$	40	A
Peak Repetitive Forward Current (Rated V_R , Square Wave, 20 kHz) $T_C = 82^\circ\text{C}$ MBR40250, MBR40250T, MBRB40250T (Rated V_R , Square Wave, 20 kHz) $T_C = 46^\circ\text{C}$ MBRF40250T	I_{FRM}	80	A
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	I_{FSM}	150	A
Storage Temperature	T_{stg}	-65 to +175	$^\circ\text{C}$
Operating Junction Temperature	T_J	-65 to +150	$^\circ\text{C}$
Voltage Rate of Change (Rated V_R)	dv/dt	10,000	V/ μs

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Maximum Thermal Resistance Junction-to-Case MBR40250(T) and MBRB40250T MBRF40250	$R_{\theta JC}$	2.0 3.0	$^\circ\text{C}/\text{W}$
Junction-to-Ambient MBR40250(T) MBRF40250 MBRB40250T	$R_{\theta JA}$	60 50 50	

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Maximum Instantaneous Forward Voltage (Note 1) $I_F = 20\text{ A}$, $T_C = 25^\circ\text{C}$ $I_F = 20\text{ A}$, $T_C = 125^\circ\text{C}$ $I_F = 40\text{ A}$, $T_C = 25^\circ\text{C}$ $I_F = 40\text{ A}$, $T_C = 125^\circ\text{C}$	V_F	0.86 0.71 0.97 0.86	V
Maximum Instantaneous Reverse Current (Note 1) Rated DC Voltage, $T_C = 25^\circ\text{C}$ Rated DC Voltage, $T_C = 125^\circ\text{C}$	I_R	0.25 30	mA
Maximum Reverse Recovery Time $I_F = 1.0\text{ A}$, di/dt = 50 A/ μs , $T_C = 25^\circ\text{C}$	t_{rr}	35	ns

DYNAMIC CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Capacitance $V_R = -5.0\text{ V}$, $T_C = 25^\circ\text{C}$, Frequency = 1.0 MHz	C_T	500	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

MBR40250G, MBR40250TG, MBRF40250TG, MBRB40250TG

TYPICAL CHARACTERISTICS

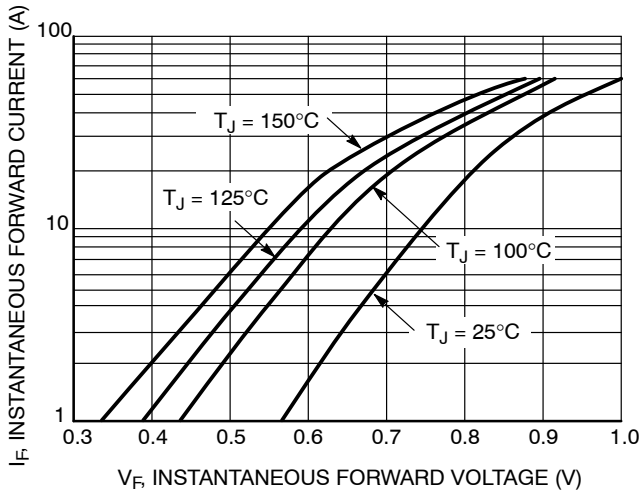


Figure 1. Typical Forward Voltage

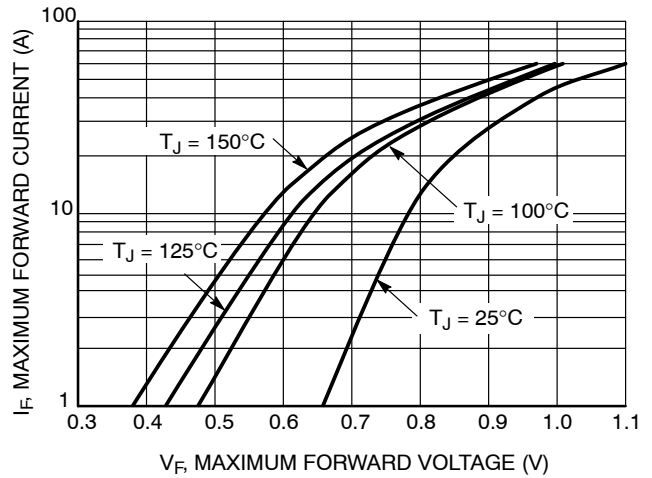


Figure 2. Maximum Forward Voltage

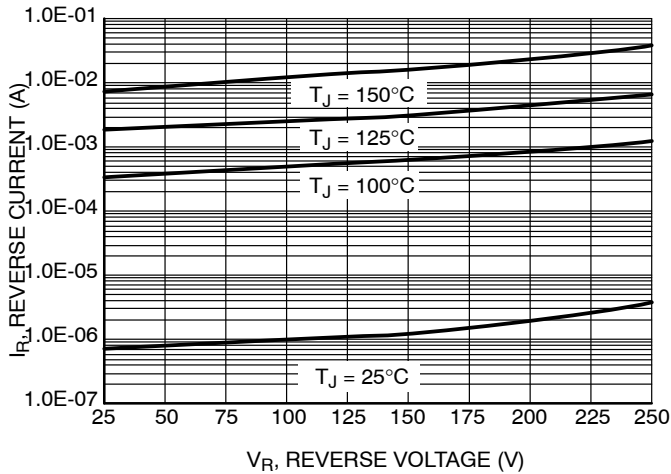


Figure 3. Typical Reverse Current

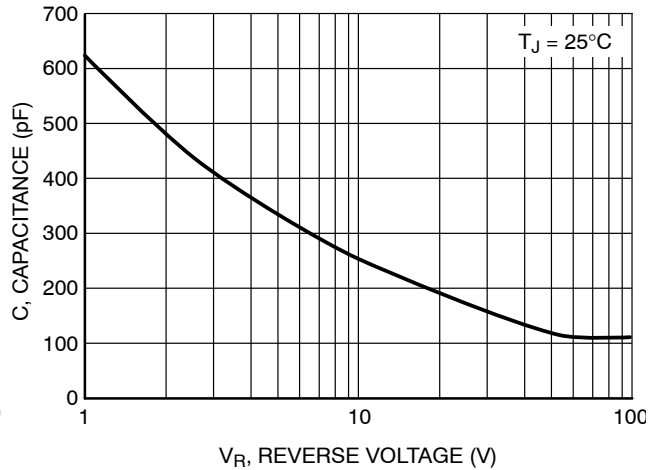


Figure 4. Typical Capacitance

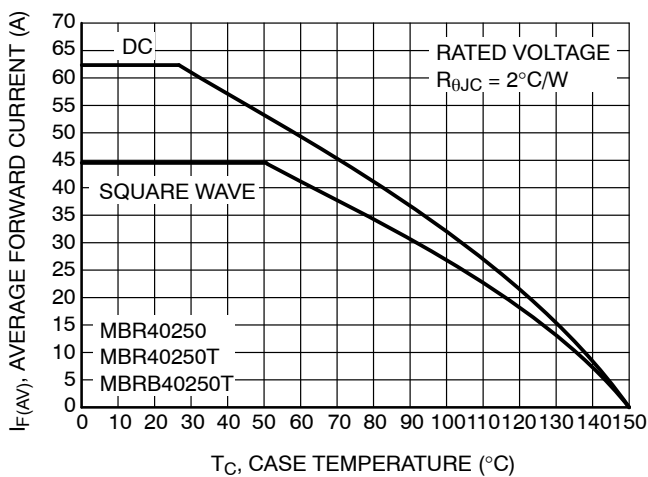


Figure 5. Current Derating (Case) for MBR40250, MBR40250T and MBRB40250T

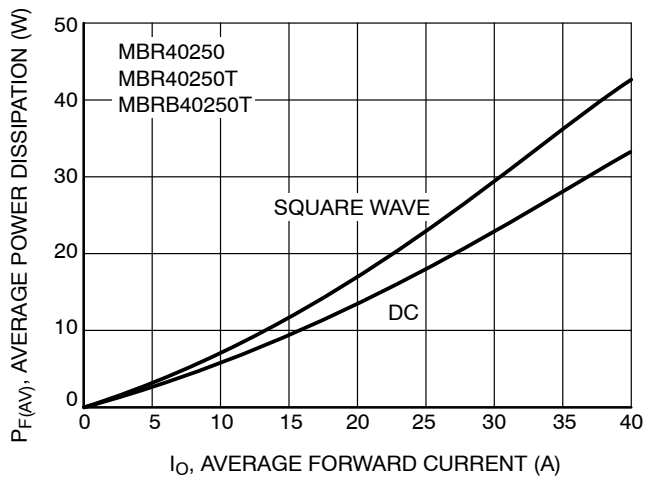


Figure 6. Forward Power Dissipation for MBR40250, MBR40250T and MBRB40250T

MBR40250G, MBR40250TG, MBRF40250TG, MBRB40250TG

TYPICAL CHARACTERISTICS

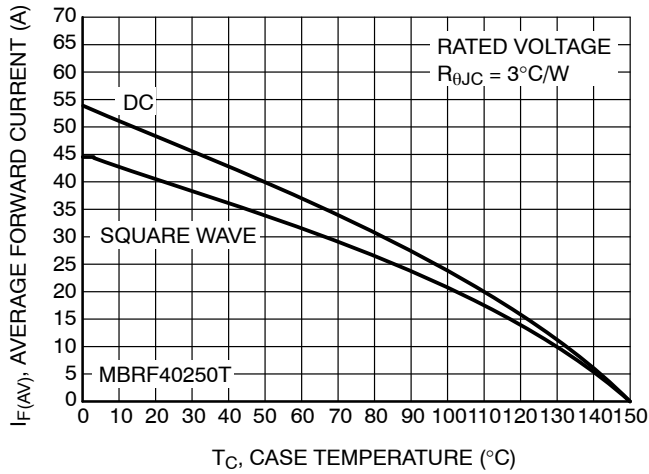


Figure 7. Current Derating (Case) for MBRF40250T

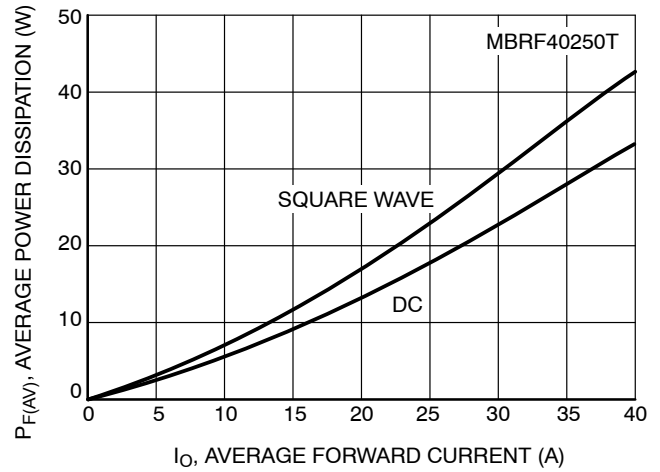


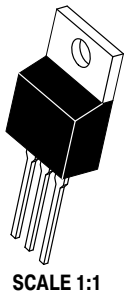
Figure 8. Forward Power Dissipation for MBRF40250T

ORDERING INFORMATION

Device	Package	Shipping†
MBR40250G	TO-220 (2-LEAD) (Pb-Free)	50 Units / Rail
MBR40250TG	TO-220 (Pb-Free)	50 Units / Rail
MBRF40250TG	TO-220 FULLPACK (Pb-Free)	50 Units / Rail
MBRB40250TG	D ² PAK 3 (Pb-Free)	50 Units / Rail
MBRB40250TT4G	D ² PAK 3 (Pb-Free)	800 Units / Tape & Reel

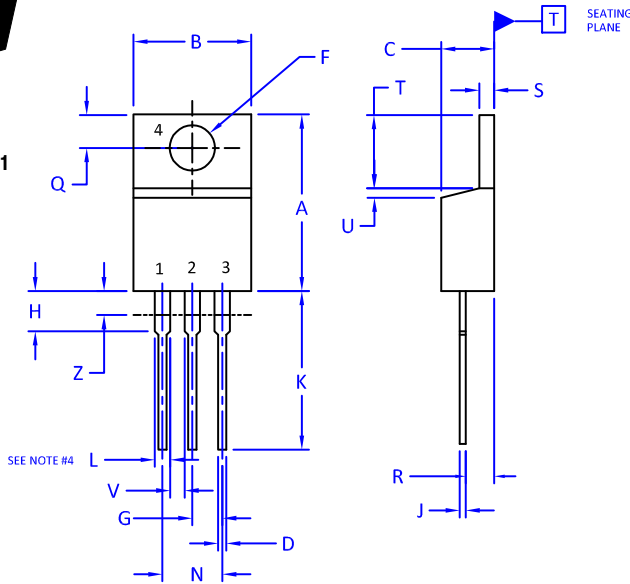
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



TO-220 CASE 221A ISSUE AK

DATE 13 JAN 2022



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
 2. CONTROLLING DIMENSION: INCHES
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
 4. MAX WIDTH FOR F102 DEVICE = 1.35MM

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.41
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. BASE
2. EMITTER
3. COLLECTOR
4. EMITTER

STYLE 3:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 4:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

STYLE 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:
PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:
PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

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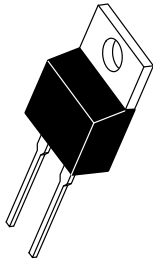
MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

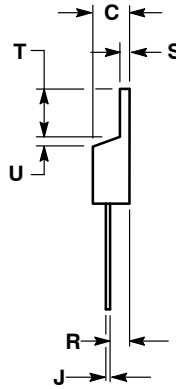
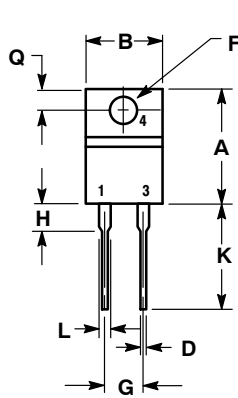


TO-220, 2-LEAD CASE 221B-04 ISSUE F

DATE 12 APR 2013



SCALE 1:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.595	0.620	15.11	15.75
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.82
D	0.025	0.039	0.64	1.00
F	0.142	0.161	3.61	4.09
G	0.190	0.210	4.83	5.33
H	0.110	0.130	2.79	3.30
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.14	1.52
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.14	1.39
T	0.235	0.255	5.97	6.48
U	0.000	0.050	0.000	1.27

STYLE 1:
PIN 1. CATHODE
2. N/A
3. ANODE
4. CATHODE

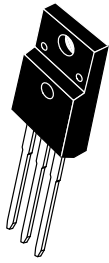
STYLE 2:
PIN 1. ANODE
2. N/A
3. CATHODE
4. ANODE

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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

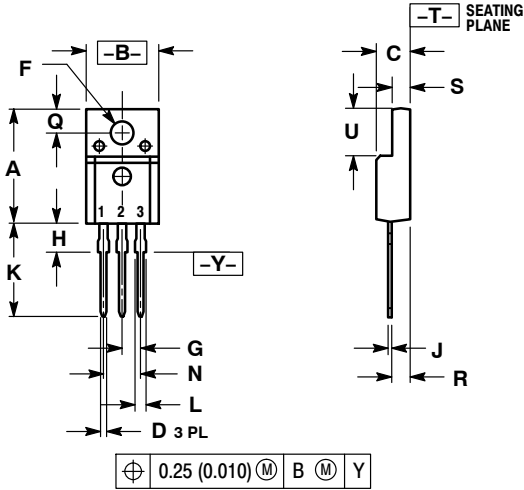
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TO-220 FULLPAK CASE 221D-03 ISSUE K

DATE 27 FEB 2009



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH
 3. 221D-01 THRU 221D-02 OBSOLETE, NEW STANDARD 221D-03.

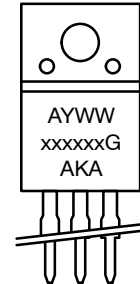
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.617	0.635	15.67	16.12
B	0.392	0.419	9.96	10.63
C	0.177	0.193	4.50	4.90
D	0.024	0.039	0.60	1.00
F	0.116	0.129	2.95	3.28
G	0.100 BSC		2.54 BSC	
H	0.118	0.135	3.00	3.43
J	0.018	0.025	0.45	0.63
K	0.503	0.541	12.78	13.73
L	0.048	0.058	1.23	1.47
N	0.200 BSC		5.08 BSC	
Q	0.122	0.138	3.10	3.50
R	0.099	0.117	2.51	2.96
S	0.092	0.113	2.34	2.87
U	0.239	0.271	6.06	6.88

MARKING DIAGRAMS

- | | | |
|--|---|--|
| STYLE 1:
PIN 1. GATE
2. DRAIN
3. SOURCE | STYLE 2:
PIN 1. BASE
2. COLLECTOR
3. EMITTER | STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE |
| STYLE 4:
PIN 1. CATHODE
2. ANODE
3. CATHODE | STYLE 5:
PIN 1. CATHODE
2. ANODE
3. GATE | STYLE 6:
PIN 1. MT 1
2. MT 2
3. GATE |



Bipolar



Rectifier

- | | |
|-------------------------------|---------------------------|
| xxxxxx = Specific Device Code | A = Assembly Location |
| G = Pb-Free Package | Y = Year |
| A = Assembly Location | WW = Work Week |
| Y = Year | xxxxxx = Device Code |
| WW = Work Week | G = Pb-Free Package |
| | AKA = Polarity Designator |

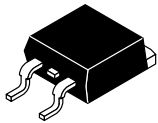
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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

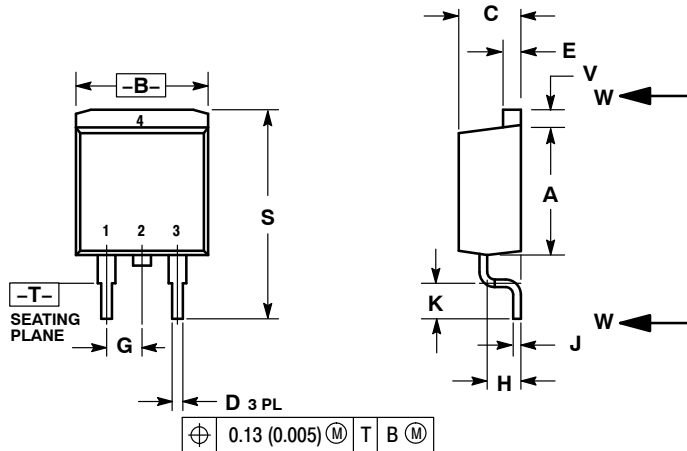
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D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

SCALE 1:1

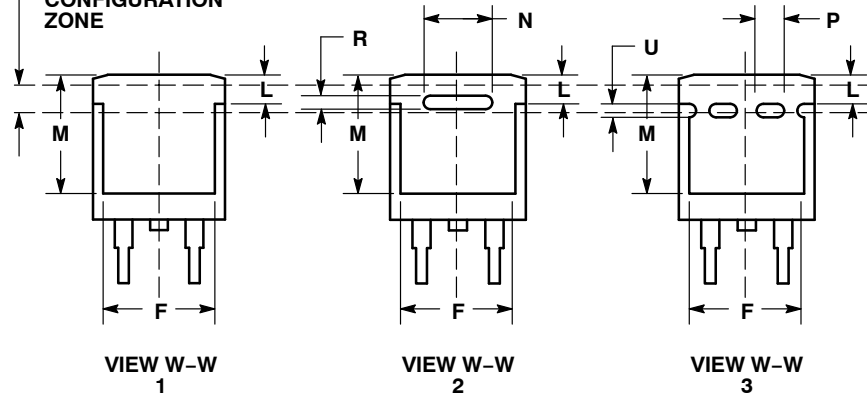


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100	BSC	2.54	BSC
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32	1.83
M	0.280	0.320	7.11	8.13
N	0.197	REF	5.00	REF
P	0.079	REF	2.00	REF
R	0.039	REF	0.99	REF
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

VARIABLE CONFIGURATION ZONE



- | | | | | | |
|--|---|---|--|---|--|
| STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN | STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE | STYLE 4:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | STYLE 5:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE | STYLE 6:
PIN 1. NO CONNECT
2. CATHODE
3. ANODE
4. CATHODE |
|--|---|---|--|---|--|

MARKING INFORMATION AND FOOTPRINT ON PAGE 2

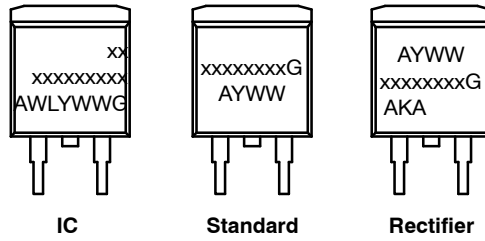
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D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

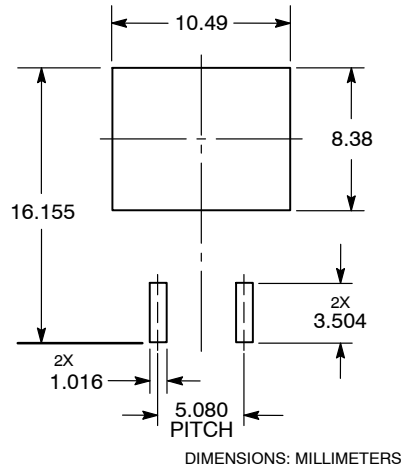
**GENERIC
MARKING DIAGRAM***



- xx = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- Y = Year
- WW = Work Week
- G = Pb-Free Package
- AKA = Polarity Indicator


*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present.

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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