

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## 250 V, 40 A SWITCHMODE™ Schottky Power Rectifier



ON Semiconductor®

<http://onsemi.com>

### 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 are Pb-Free Devices\*

### Benefits

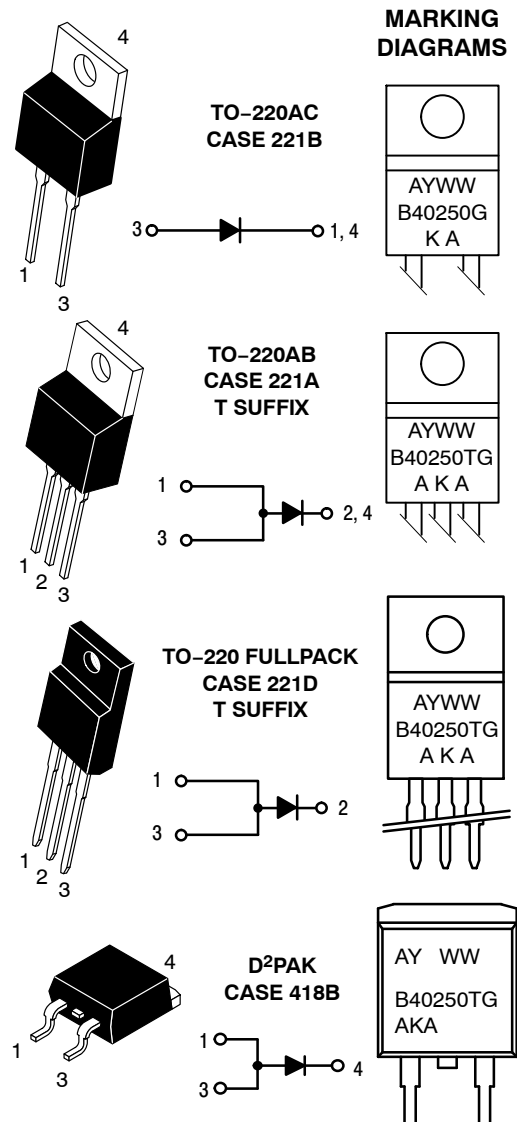
- Reduces or Eliminates Reverse Recovery Oscillations
- Minimizes Need for EMI Filtering
- Reduces Switching Losses
- Improved Efficiency

### 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



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

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

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## 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/ $\mu\text{s}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## THERMAL CHARACTERISTICS

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

## ELECTRICAL CHARACTERISTICS

Rating	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 $I_F = 1.0\text{ A}, di/dt = 50\text{ A}/\mu\text{s}, T_C = 25^\circ\text{C}$	$t_{rr}$	35	ns

## DYNAMIC CHARACTERISTICS

Capacitance $V_R = -5.0\text{ V}, T_C = 25^\circ\text{C}, \text{Frequency} = 1.0\text{ MHz}$	$C_T$	500	pF
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1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## TYPICAL CHARACTERISTICS

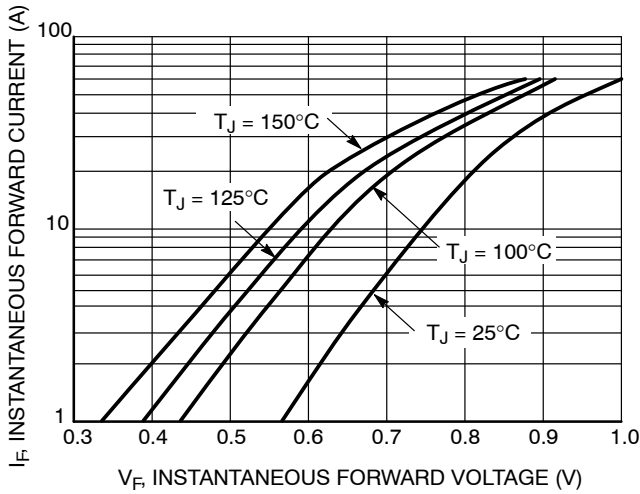


Figure 1. Typical Forward Voltage

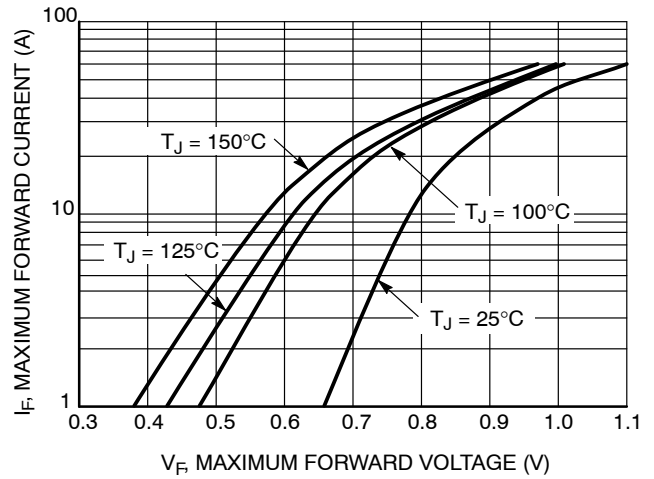


Figure 2. Maximum Forward Voltage

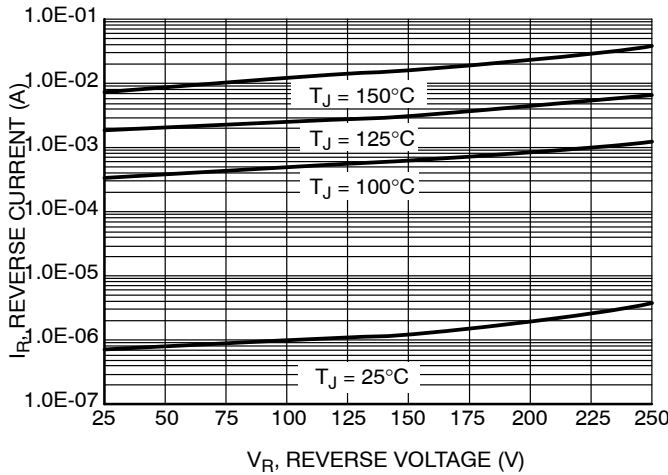


Figure 3. Typical Reverse Current

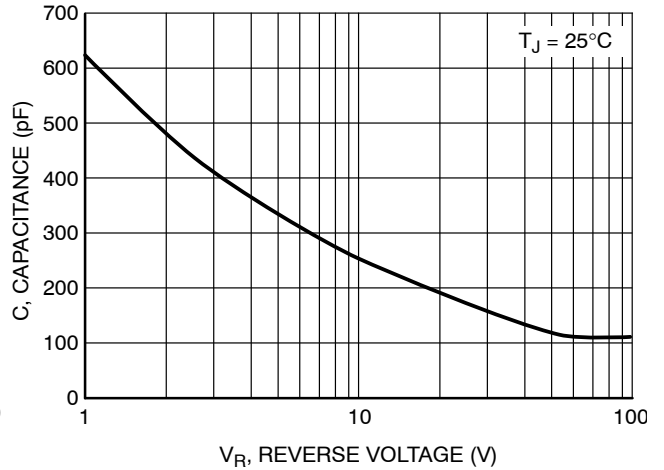


Figure 4. Typical Capacitance

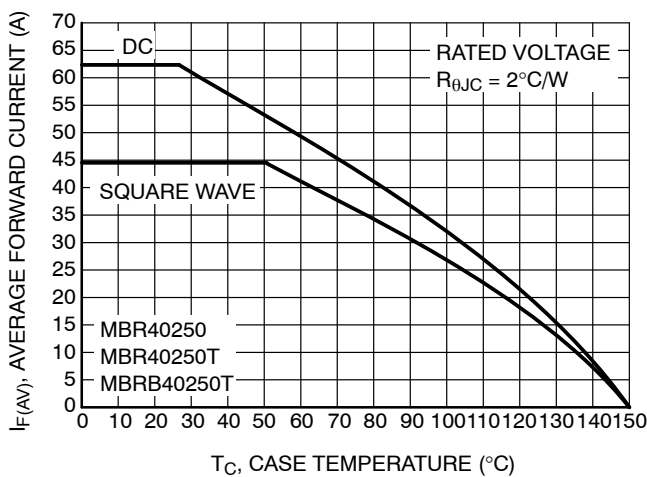


Figure 5. Current Derating (Case) for MBR40250, MBR40250T and MBRB40250T

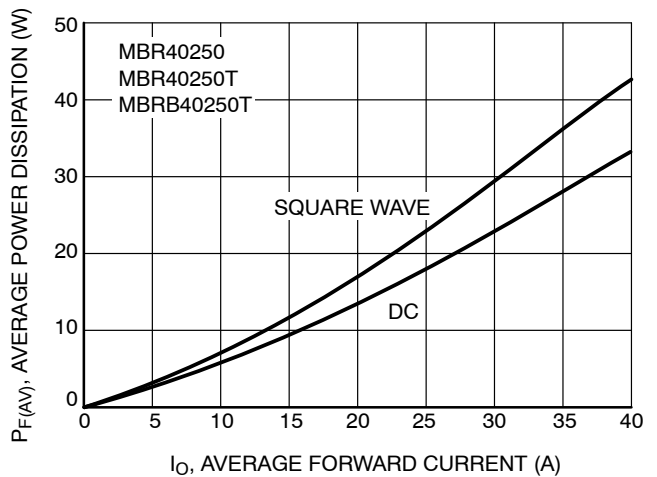


Figure 6. Forward Power Dissipation for MBR40250, MBR40250T and MBRB40250T

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## TYPICAL CHARACTERISTICS

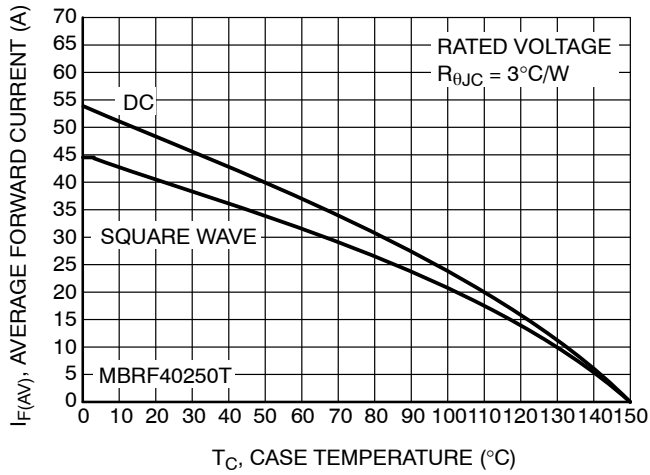


Figure 7. Current Derating (Case) for MBRF40250T

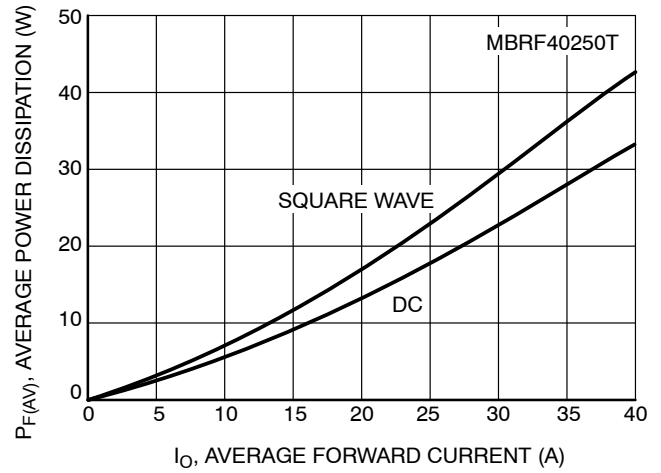


Figure 8. Forward Power Dissipation for MBRF40250T

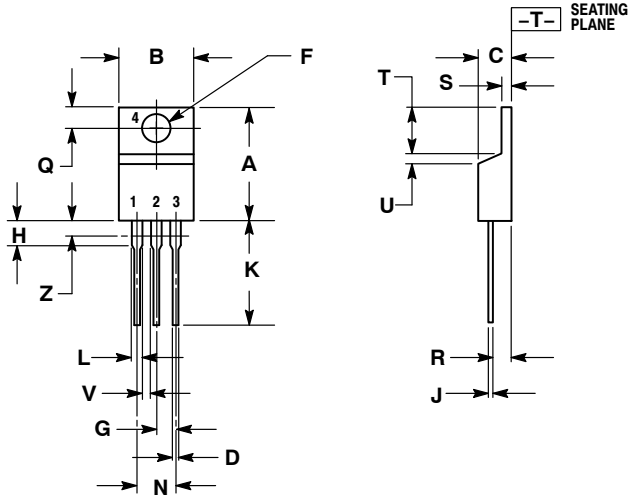
### ORDERING INFORMATION

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

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## PACKAGE DIMENSIONS

### TO-220 CASE 221A-09 ISSUE AF

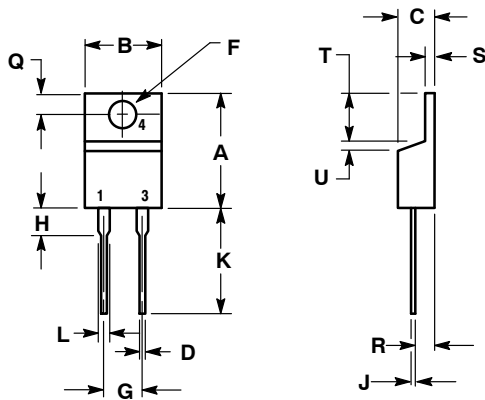


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.025	0.36	0.64
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	1.39
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 6:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

### TO-220AC CASE 221B-04 ISSUE E



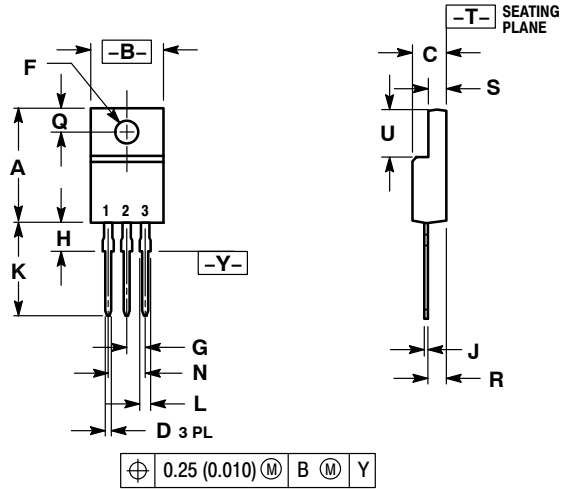
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

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	0.035	0.64	0.89
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	0.00	1.27

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## PACKAGE DIMENSIONS

TO-220 FULLPAK  
CASE 221D-03  
ISSUE J



NOTES:

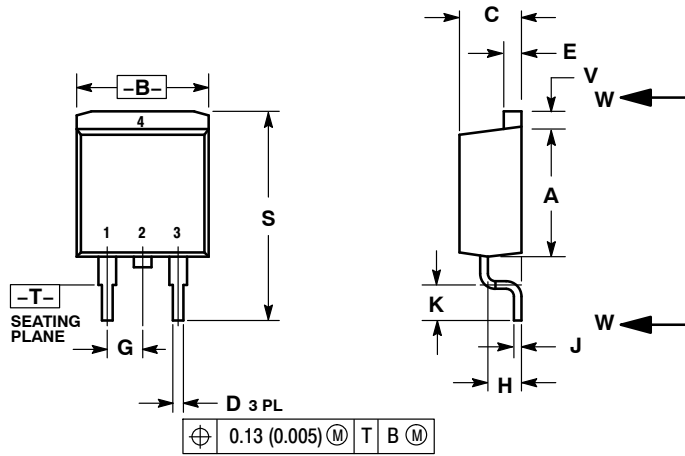
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH
3. 221D-01 THRU 221D-02 OBSOLETE, NEW STANDARD 221D-03.

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

# MBR40250, MBR40250T, MBRF40250T, MBRB40250T

## PACKAGE DIMENSIONS

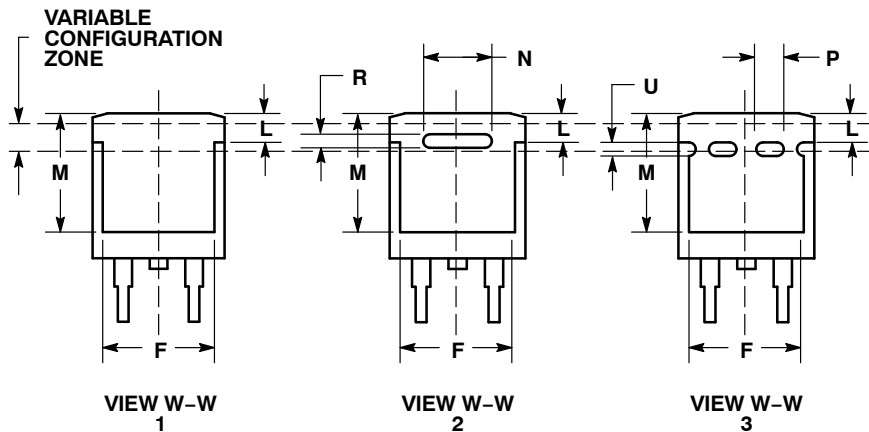
D<sup>2</sup>PAK 3  
CASE 418B-04  
ISSUE K



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



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