

# MC79M00 Series

## 500 mA Negative Voltage Regulators

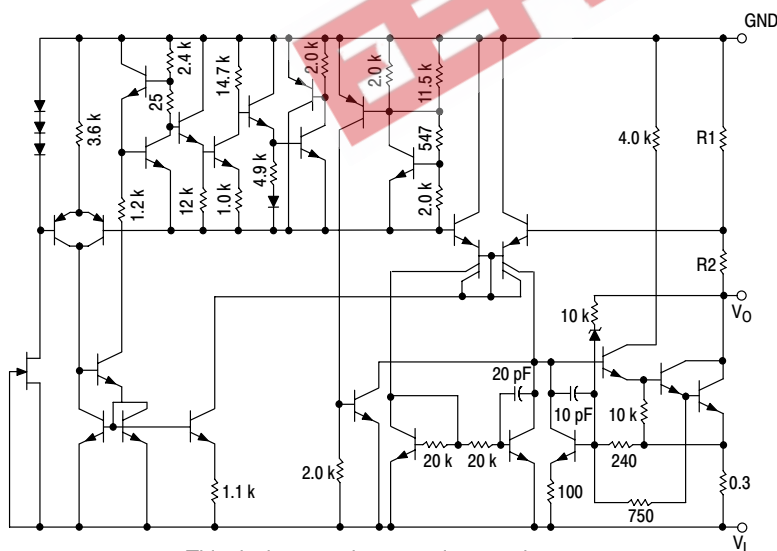
The MC79M00 series of fixed output negative voltage regulators are intended as complements to the popular MC78M00 series devices.

Available in fixed output voltage options of  $-5.0\text{ V}$ ,  $-8.0\text{ V}$ ,  $-12\text{ V}$  and  $-15\text{ V}$ , these regulators employ current limiting, thermal shutdown, and safe-area compensation, making them remarkably rugged under most operating conditions. With adequate heatsinking they can deliver output currents in excess of  $0.5\text{ A}$ .

- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Also Available in Surface Mount DPAK (DT) Package
- Pb-Free Packages are Available

### DEVICE TYPE/NOMINAL OUTPUT VOLTAGE

Device	Nominal Output Voltage
MC79M05	$-5.0\text{ V}$
MC79M08	$-8.0\text{ V}$
MC79M12	$-12\text{ V}$
MC79M15	$-15\text{ V}$



This device contains 31 active transistors.

Figure 1. Representative Schematic Diagram

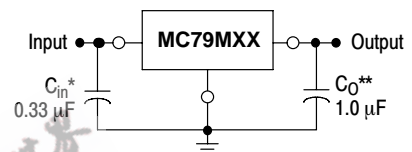


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### THREE-TERMINAL NEGATIVE FIXED VOLTAGE REGULATORS

#### STANDARD APPLICATION

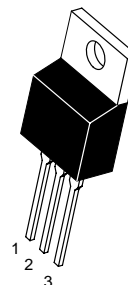


A common ground is required between the input and the output voltages. The input voltage must remain typically  $1.1\text{ V}$  more negative even during the high point of the input ripple voltage.

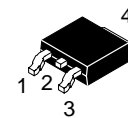
XX These two digits of the type number indicate nominal voltage.

\*  $C_{in}$  is required if regulator is located an appreciable distance from power supply filter.

\*\*  $C_o$  improve stability and transient response.

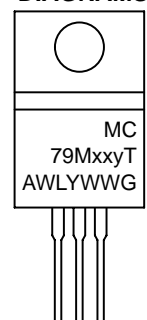


TO-220-3  
T SUFFIX  
CASE 221AB

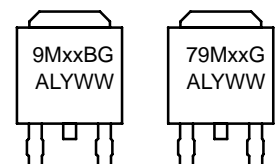


DPAK-3  
DT SUFFIX  
CASE 369C

#### MARKING DIAGRAMS



Pin 1. Ground  
2. Input  
3. Output



xx = 05, 08, 12, or 15  
y = B or C  
A = Assembly Location  
WL, L = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Device

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

## MC79M00 Series

**MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted.)

Rating	Symbol	Value	Unit
Input Voltage	$V_I$	-35	Vdc
Power Dissipation			
Case 221A (TO-220-3)			
$T_A = 25^\circ\text{C}$	$P_D$	Internally Limited	W
Thermal Resistance, Junction-to-Ambient	$\theta_{JA}$	65	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$\theta_{JC}$	5.0	$^\circ\text{C/W}$
Case 369C (DPAK-3)			
$T_A = 25^\circ\text{C}$	$P_D$	Internally Limited	W
Thermal Resistance, Junction-to-Ambient	$\theta_{JA}$	92	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$\theta_{JC}$	6.0	$^\circ\text{C/W}$
Storage Junction Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-40 to +150	$^\circ\text{C}$

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.

\*This device series contains ESD protection and exceeds the following tests:

- Human Body Model 2000 V per MIL-STD-883, Method 3015
- Machine Model Method 200 V

### MC79M05B, C

**ELECTRICAL CHARACTERISTICS** ( $V_I = -10\text{ V}$ ,  $I_O = 350\text{ mA}$ ,  $T_{low}$  to  $T_{high}$  (Note 2), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = 25^\circ\text{C}$ )	$V_O$	-4.8	-5.0	-5.2	Vdc
Line Regulation, $T_J = 25^\circ\text{C}$ (Note 1) -7.0 Vdc $\geq V_I \geq$ -25 Vdc -8.0 Vdc $\geq V_I \geq$ -18 Vdc	$Reg_{line}$	-	7.0 2.0	50 30	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 1) $5.0\text{ mA} \leq I_O \leq 500\text{ mA}$	$Reg_{load}$	-	30	100	mV
Output Voltage -7.0 Vdc $\geq V_I \geq$ -25 Vdc, $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$	$V_O$	-4.75	-	-5.25	Vdc
Input Bias Current ( $T_J = 25^\circ\text{C}$ )	$I_{IB}$	-	4.3	8.0	mA
Input Bias Current Change -8.0 Vdc $\geq V_I \geq$ -25 Vdc, $I_O = 350\text{ mA}$ $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$ , $V_I = -10\text{ V}$	$\Delta I_{IB}$	-	-	0.4 0.4	mA
Output Noise Voltage, $T_A = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$	$V_n$	-	40	-	$\mu\text{V}$
Ripple Rejection ( $f = 120\text{ Hz}$ )	RR	54	66	-	dB
Dropout Voltage $I_O = 500\text{ mA}$ , $T_J = 25^\circ\text{C}$	$V_I - V_O$	-	1.1	-	Vdc
Average Temperature Coefficient of Output Voltage $I_O = 5.0\text{ mA}$ , $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$	$\Delta V_O / \Delta T$	-	0.2	-	mV/ $^\circ\text{C}$

1. Load and line regulation are specified at constant temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
2. B =  $T_{low}$  to  $T_{high}$ ,  $-40^\circ\text{C} < T_J < 125^\circ\text{C}$  C =  $T_{low}$  to  $T_{high}$ ,  $0^\circ\text{C} < T_J < 125^\circ\text{C}$ .

## MC79M00 Series

### MC79M08B, C

**ELECTRICAL CHARACTERISTICS** ( $V_I = -10\text{ V}$ ,  $I_O = 350\text{ mA}$ ,  $T_{low}$  to  $T_{high}$  (Note 4), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = 25^\circ\text{C}$ )	$V_O$	-7.7	-8.0	-8.3	Vdc
Line Regulation, $T_J = 25^\circ\text{C}$ (Note 3) -7.0 Vdc $\geq V_I \geq -25\text{ Vdc}$ -8.0 Vdc $\geq V_I \geq -18\text{ Vdc}$	$\text{Reg}_{line}$	-	5.0 3.0	80 50	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 3) $5.0\text{ mA} \leq I_O \leq 500\text{ mA}$	$\text{Reg}_{load}$	-	30	100	mV
Output Voltage -7.0 Vdc $\geq V_I \geq -25\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$	$V_O$	-7.6	-8.0	-8.4	Vdc
Input Bias Current ( $T_J = 25^\circ\text{C}$ )	$I_{IB}$	-	-	8.0	mA
Input Bias Current Change -8.0 Vdc $\geq V_I \geq -25\text{ Vdc}$ , $I_O = 350\text{ mA}$ $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$ , $V_I = -10\text{ V}$	$\Delta I_{IB}$	-	-	0.4 0.4	mA
Output Noise Voltage, $T_A = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$	$V_n$	-	60	-	$\mu\text{V}$
Ripple Rejection ( $f = 120\text{ Hz}$ )	RR	54	63	-	dB
Dropout Voltage $I_O = 500\text{ mA}$ , $T_J = 25^\circ\text{C}$	$V_I - V_O$	-	1.1	-	Vdc
Average Temperature Coefficient of Output Voltage $I_O = 5.0\text{ mA}$ , $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$	$\Delta V_O / \Delta T$	-	0.4	-	mV/ $^\circ\text{C}$

3. Load and line regulation are specified at constant temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

4. B =  $T_{low}$  to  $T_{high}$ ,  $-40^\circ\text{C} < T_J < 125^\circ\text{C}$   
C =  $T_{low}$  to  $T_{high}$ ,  $0^\circ\text{C} < T_J < 125^\circ\text{C}$

### MC79M12B, C

**ELECTRICAL CHARACTERISTICS** ( $V_I = -19\text{ V}$ ,  $I_O = 350\text{ mA}$ ,  $T_{low}$  to  $T_{high}$  (Note 6), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = 25^\circ\text{C}$ )	$V_O$	-11.5	-12	-12.5	Vdc
Line Regulation, $T_J = 25^\circ\text{C}$ (Note 5) -14.5 Vdc $\geq V_I \geq -30\text{ Vdc}$ -15 Vdc $\geq V_I \geq -25\text{ Vdc}$	$\text{Reg}_{line}$	-	5.0 3.0	80 50	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 5) $5.0\text{ mA} \leq I_O \leq 500\text{ mA}$	$\text{Reg}_{load}$	-	30	240	mV
Output Voltage -14.5 Vdc $\geq V_I \geq -30\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$	$V_O$	-11.4	-	-12.6	Vdc
Input Bias Current ( $T_J = 25^\circ\text{C}$ )	$I_{IB}$	-	4.4	8.0	mA
Input Bias Current Change -14.5 Vdc $\geq V_I \geq -30\text{ Vdc}$ , $I_O = 350\text{ mA}$ $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$ , $V_I = -19\text{ V}$	$\Delta I_{IB}$	-	-	0.4 0.4	mA
Output Noise Voltage, $T_A = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$	$V_n$	-	75	-	$\mu\text{V}$
Ripple Rejection ( $f = 120\text{ Hz}$ )	RR	54	60	-	dB
Dropout Voltage $I_O = 500\text{ mA}$ , $T_J = 25^\circ\text{C}$	$V_I - V_O$	-	1.1	-	Vdc
Average Temperature Coefficient of Output Voltage $I_O = 5.0\text{ mA}$ , $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$	$\Delta V_O / \Delta T$	-	-0.8	-	mV/ $^\circ\text{C}$

5. Load and line regulation are specified at constant temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

6. B =  $T_{low}$  to  $T_{high}$ ,  $-40^\circ\text{C} < T_J < 125^\circ\text{C}$   
C =  $T_{low}$  to  $T_{high}$ ,  $0^\circ\text{C} < T_J < 125^\circ\text{C}$

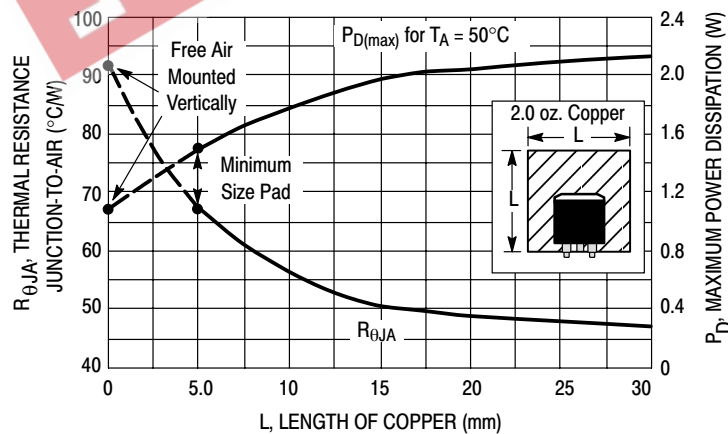
## MC79M00 Series

### MC79M15B, C

**ELECTRICAL CHARACTERISTICS** ( $V_I = -23\text{ V}$ ,  $I_O = 350\text{ mA}$ ,  $T_{\text{low}}$  to  $T_{\text{high}}$  (Note 8), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = 25^\circ\text{C}$ )	$V_O$	-14.4	-15	-15.6	Vdc
Line Regulation, $T_J = 25^\circ\text{C}$ (Note 7) -17.5 Vdc $\geq V_I \geq$ -30 Vdc -18 Vdc $\geq V_I \geq$ -28 Vdc	Reg <sub>line</sub>	-	5.0 3.0	80 50	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 7) 5.0 mA $\leq I_O \leq$ 500 mA	Reg <sub>load</sub>	-	30	240	mV
Output Voltage -17.5 Vdc $\geq V_I \geq$ -30 Vdc, 5.0 mA $\leq I_O \leq$ 350 mA	$V_O$	-14.25	-	-15.75	Vdc
Input Bias Current ( $T_J = 25^\circ\text{C}$ )	$I_{IB}$	-	4.4	8.0	mA
Input Bias Current Change -17.5 Vdc $\geq V_I \geq$ -30 Vdc, $I_O = 350\text{ mA}$ 5.0 mA $\leq I_O \leq$ 350 mA, $V_I = -23\text{ V}$	$\Delta I_{IB}$	-	-	0.4 0.4	mA
Output Noise Voltage, $T_A = 25^\circ\text{C}$ , 10 Hz $\leq f \leq$ 100 kHz	$V_n$	-	90	-	$\mu\text{V}$
Ripple Rejection ( $f = 120\text{ Hz}$ )	RR	54	60	-	dB
Dropout Voltage $I_O = 500\text{ mA}$ , $T_J = 25^\circ\text{C}$	$V_I - V_O$	-	1.1	-	Vdc
Average Temperature Coefficient of Output Voltage $I_O = 5.0\text{ mA}$ , $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$	$\Delta V_O / \Delta T$	-	-1.0	-	mV/ $^\circ\text{C}$

7. Load and line regulation are specified at constant temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
8. B =  $T_{\text{low}}$  to  $T_{\text{high}}$ ,  $-40^\circ\text{C} < T_J < 125^\circ\text{C}$   
C =  $T_{\text{low}}$  to  $T_{\text{high}}$ ,  $0^\circ\text{C} < T_J < 125^\circ\text{C}$



**Figure 1. DPAK-3 Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length**

## MC79M00 Series

### ORDERING INFORMATION

Device	Output Voltage Tolerance	Operating Temperature Range	Package	Shipping <sup>†</sup>		
MC79M05BDT	4.0%	$T_J = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DPAK	75 Units / Rail		
MC79M05BDTG			DPAK (Pb-Free)	75 Units / Rail		
MC79M05BDTRK			DPAK	2500 Units / Reel		
MC79M05BDTRKG			DPAK (Pb-Free)	2500 Units / Reel		
MC79M05BT			TO-220	50 Units / Rail		
MC79M05BTG			TO-220 (Pb-Free)	50 Units / Rail		
MC79M05CDT		$T_J = 0^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DPAK	75 Units / Rail		
MC79M05CDTG			DPAK (Pb-Free)	75 Units / Rail		
MC79M05CDTRK			DPAK	2500 Units / Reel		
MC79M05CDTRKG			DPAK (Pb-Free)	2500 Units / Reel		
MC79M05CT			TO-220	50 Units / Rail		
MC79M05CTG			TO-220 (Pb-Free)	50 Units / Rail		
MC79M08BDT		4.0%	$T_J = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DPAK	75 Units / Rail	
MC79M08BDTRK				DPAK	2500 Units / Reel	
MC79M08BDTRKG				DPAK (Pb-Free)	2500 Units / Reel	
MC79M08BT				TO-220	50 Units / Rail	
MC79M08BTG				TO-220 (Pb-Free)	50 Units / Rail	
MC79M08CDT				$T_J = 0^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DPAK	75 Units / Rail
MC79M08CDTG			DPAK (Pb-Free)		75 Units / Rail	
MC79M08CDTRK			DPAK		2500 Units / Reel	
MC79M08CDTRKG			DPAK (Pb-Free)		2500 Units / Reel	
MC79M08CT			TO-220		50 Units / Rail	
MC79M08CTG			TO-220 (Pb-Free)		50 Units / Rail	
MC79M12BDT			4.0%	$T_J = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DPAK	75 Units / Rail
MC79M12BDTG					DPAK (Pb-Free)	75 Units / Rail
MC79M12BDTRK					DPAK	2500 Units / Reel
MC79M12BDTRKG					DPAK (Pb-Free)	2500 Units / Reel
MC79M12BT					TO-220	50 Units / Rail
MC79M12BTG					TO-220 (Pb-Free)	50 Units / Rail
MC79M12CDT				$T_J = 0^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DPAK	75 Units / Rail
MC79M12CDTG	DPAK (Pb-Free)				75 Units / Rail	
MC79M12CDTRK	DPAK				2500 Units / Reel	
MC79M12CDTRKG	DPAK (Pb-Free)				2500 Units / Reel	
MC79M12CT	TO-220				50 Units / Rail	
MC79M12CTG	TO-220 (Pb-Free)				50 Units / Rail	

<sup>†</sup>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.

## MC79M00 Series

### ORDERING INFORMATION

Device	Output Voltage Tolerance	Operating Temperature Range	Package	Shipping†
MC79M15BDT	4.0%	$T_J = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DAK	75 Units / Rail
MC79M15BDTG			DAK (Pb-Free)	75 Units / Rail
MC79M15BDTRK			DAK	2500 Units / Reel
MC79M15BDTRKG			DAK (Pb-Free)	2500 Units / Reel
MC79M15BT			TO-220	50 Units / Rail
MC79M15BTG			TO-220 (Pb-Free)	50 Units / Rail
MC79M15CDT		$T_J = 0^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	DAK	75 Units / Rail
MC79M15CDTG			DAK (Pb-Free)	75 Units / Rail
MC79M15CDTRK			DAK	2500 Units / Reel
MC79M15CDTRKG			DAK (Pb-Free)	2500 Units / Reel
MC79M15CT			TO-220	50 Units / Rail
MC79M15CTG			TO-220 (Pb-Free)	50 Units / Rail

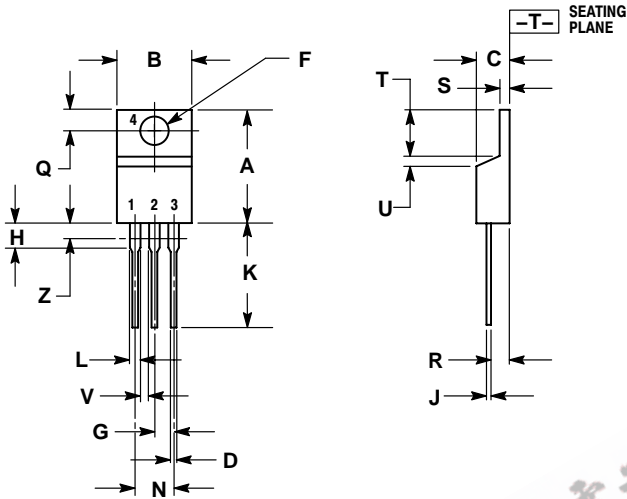
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



# MC79M00 Series

## PACKAGE DIMENSIONS

TO-220, SINGLE GAUGE  
T SUFFIX  
CASE 221AB-01  
ISSUE O



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.

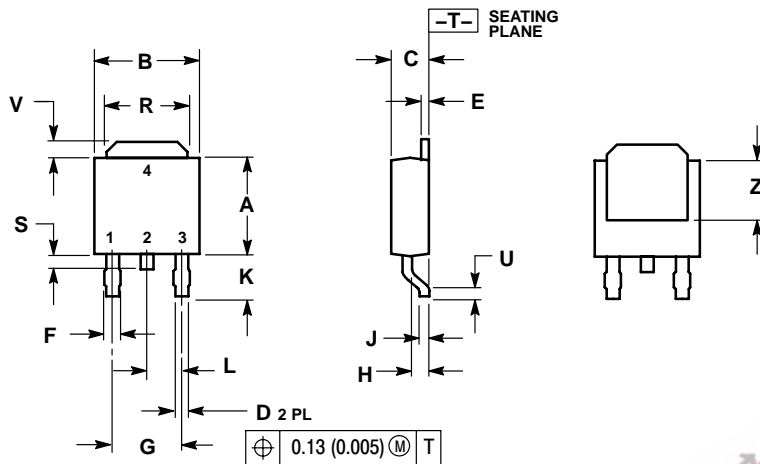
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.020	0.055	0.508	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

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# MC79M00 Series

## PACKAGE DIMENSIONS

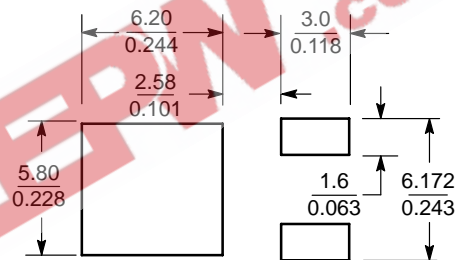
DPAK-3  
DT SUFFIX  
CASE 369C-01  
ISSUE O



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	---	0.51	---
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

### SOLDERING FOOTPRINT\*



SCALE 3:1 ( $\frac{\text{mm}}{\text{inches}}$ )

\*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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