

500 mA Negative Voltage Regulators

Available in fixed output voltage options of -5.0 V , -8.0 V , -12 V and -15 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 A .

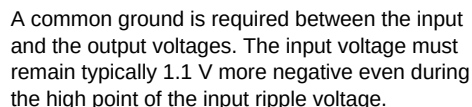
- ### DEVICE TYPE/NOMINAL OUTPUT VOLTAGE

The circuit diagram illustrates a 12-bit DAC implementation. It features a 74VHC04 inverter chain (U1) and a 74VHC14 Schmitt trigger (U2). The DAC output is generated by a network of resistors (R1, R2) and a feedback network (R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100). The output is connected to a 10 kΩ resistor (R1) and a 10 kΩ resistor (R2). The output is also connected to a 10 kΩ resistor (R3) and a 10 kΩ resistor (R4). The output is connected to a 10 kΩ resistor (R5) and a 10 kΩ resistor (R6). The output is connected to a 10 kΩ resistor (R7) and a 10 kΩ resistor (R8). The output is connected to a 10 kΩ resistor (R9) and a 10 kΩ resistor (R10). The output is connected to a 10 kΩ resistor (R11) and a 10 kΩ resistor (R12). The output is connected to a 10 kΩ resistor (R13) and a 10 kΩ resistor (R14). The output is connected to a 10 kΩ resistor (R15) and a 10 kΩ resistor (R16). The output is connected to a 10 kΩ resistor (R17) and a 10 kΩ resistor (R18). The output is connected to a 10 kΩ resistor (R19) and a 10 kΩ resistor (R20). The output is connected to a 10 kΩ resistor (R21) and a 10 kΩ resistor (R22). The output is connected to a 10 kΩ resistor (R23) and a 10 kΩ resistor (R24). The output is connected to a 10 kΩ resistor (R25) and a 10 kΩ resistor (R26). The output is connected to a 10 kΩ resistor (R27) and a 10 kΩ resistor (R28). The output is connected to a 10 kΩ resistor (R29) and a 10 kΩ resistor (R30). The output is connected to a 10 kΩ resistor (R31) and a 10 kΩ resistor (R32). The output is connected to a 10 kΩ resistor (R33) and a 10 kΩ resistor (R34). The output is connected to a 10 kΩ resistor (R35) and a 10 kΩ resistor (R36). The output is connected to a 10 kΩ resistor (R37) and a 10 kΩ resistor (R38). The output is connected to a 10 kΩ resistor (R39) and a 10 kΩ resistor (R40). The output is connected to a 10 kΩ resistor (R41) and a 10 kΩ resistor (R42). The output is connected to a 10 kΩ resistor (R43) and a 10 kΩ resistor (R44). The output is connected to a 10 kΩ resistor (R45) and a 10 kΩ resistor (R46). The output is connected to a 10 kΩ resistor (R47) and a 10 kΩ resistor (R48). The output is connected to a 10 kΩ resistor (R49) and a 10 kΩ resistor (R50). The output is connected to a 10 kΩ resistor (R51) and a 10 kΩ resistor (R52). The output is connected to a 10 kΩ resistor (R53) and a 10 kΩ resistor (R54). The output is connected to a 10 kΩ resistor (R55) and a 10 kΩ resistor (R56). The output is connected to a 10 kΩ resistor (R57) and a 10 kΩ resistor (R58). The output is connected to a 10 kΩ resistor (R59) and a 10 kΩ resistor (R60). The output is connected to a 10 kΩ resistor (R61) and a 10 kΩ resistor (R62). The output is connected to a 10 kΩ resistor (R63) and a 10 kΩ resistor (R64). The output is connected to a 10 kΩ resistor (R65) and a 10 kΩ resistor (R66). The output is connected to a 10 kΩ resistor (R67) and a 10 kΩ resistor (R68). The output is connected to a 10 kΩ resistor (R69) and a 10 kΩ resistor (R70). The output is connected to a 10 kΩ resistor (R71) and a 10 kΩ resistor (R72). The output is connected to a 10 kΩ resistor (R73) and a 10 kΩ resistor (R74). The output is connected to a 10 kΩ resistor (R75) and a 10 kΩ resistor (R76). The output is connected to a 10 kΩ resistor (R77) and a 10 kΩ resistor (R78). The output is connected to a 10 kΩ resistor (R79) and a 10 kΩ resistor (R80). The output is connected to a 10 kΩ resistor (R81) and a 10 kΩ resistor (R82). The output is connected to a 10 kΩ resistor (R83) and a 10 kΩ resistor (R84). The output is connected to a 10 kΩ resistor (R85) and a 10 kΩ resistor (R86). The output is connected to a 10 kΩ resistor (R87) and a 10 kΩ resistor (R88). The output is connected to a 10 kΩ resistor (R89) and a 10 kΩ resistor (R90). The output is connected to a 10 kΩ resistor (R91) and a 10 kΩ resistor (R92). The output is connected to a 10 kΩ resistor (R93) and a 10 kΩ resistor (R94). The output is connected to a 10 kΩ resistor (R95) and a 10 kΩ resistor (R96). The output is connected to a 10 kΩ resistor (R97) and a 10 kΩ resistor (R98). The output is connected to a 10 kΩ resistor (R99) and a 10 kΩ resistor (R100).



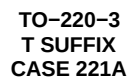
<http://onsemi.com>

STANDARD APPLICATION



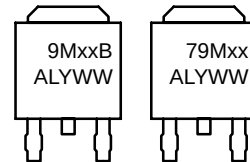
* C_{in} is required if regulator is located an appreciable distance from power supply filter.

- ** C_O improve stability and transient response.



DPAK-3
DT SUFFIX
CASE 369C

MC
79MxxYT
AWLYWW



ORDERING INFORMATION

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July, 2004 – Rev. 9

MC79M00 Series

MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted.)

Rating	Symbol	Value	Unit
Input Voltage	V _I	-35	Vdc
Power Dissipation			
Case 221A (TO-220-3)			
T _A = 25°C	P _D	Internally Limited	W
Thermal Resistance, Junction-to-Ambient	μJ _A	65	°C/W
Thermal Resistance, Junction-to-Case	μJ _C	5.0	°C/W
Case 369C (DPAK-3)			
T _A = 25°C	P _D	Internally Limited	W
Thermal Resistance, Junction-to-Ambient	μJ _A	92	°C/W
Thermal Resistance, Junction-to-Case	μJ _C	6.0	°C/W
Storage Junction Temperature	T _{stg}	-65 to +150	°C
Junction Temperature	T _J	150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

NOTE: ESD data available upon request.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R _{μJA}	65	°C/W
Thermal Resistance, Junction-to-Case	R _{μJC}	5.0	°C/W

MC79M05B, C

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

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (T _J = 25°C)	V _O	-4.8	-5.0	-5.2	Vdc
Line Regulation, T _J = 25°C (Note 1) -7.0 Vdc ≥ V _I ≥ -25 Vdc -8.0 Vdc ≥ V _I ≥ -18 Vdc	Reg _{line}	-	7.0 2.0	50 30	mV
Load Regulation, T _J = 25°C (Note 1) 5.0 mA ≤ I _O ≤ 500 mA	Reg _{load}	-	30	100	mV
Output Voltage -7.0 Vdc ≥ V _I ≥ -25 Vdc, 5.0 mA ≤ I _O ≤ 350 mA	V _O	-4.75	-	-5.25	Vdc
Input Bias Current (T _J = 25°C)	I _{IB}	-	4.3	8.0	mA
Input Bias Current Change -8.0 Vdc ≥ V _I ≥ -25 Vdc, I _O = 350 mA 5.0 mA ≤ I _O ≤ 350 mA, V _I = -10 V	ΔI _{IB}	-	-	0.4 0.4	mA
Output Noise Voltage, T _A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V _n	-	40	-	μV
Ripple Rejection (f = 120 Hz)	RR	54	66	-	dB
Dropout Voltage I _O = 500 mA, T _J = 25°C	V _I -V _O	-	1.1	-	Vdc
Average Temperature Coefficient of Output Voltage I _O = 5.0 mA, 0°C ≤ T _J ≤ 125°C	ΔV _O /ΔT	-	0.2	-	mV/°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°C < T_J < 125°C C = T_{low} to T_{high}, 0°C < T_J < 125°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 Vdc -8.0 Vdc $\geq V_I \geq$ -18 Vdc	Reg_{line}	- -	5.0 3.0	80 50	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 3) 5.0 mA $\leq I_O \leq$ 500 mA	Reg_{load}	-	30	100	mV
Output Voltage -7.0 Vdc $\geq V_I \geq$ -25 Vdc, 5.0 mA $\leq I_O \leq$ 350 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 Vdc, $I_O = 350\text{ mA}$ 5.0 mA $\leq I_O \leq$ 350 mA, $V_I = -10\text{ V}$	ΔI_{IB}	- -	- -	0.4 0.4	mA
Output Noise Voltage, $T_A = 25^\circ\text{C}$, 10 Hz $\leq f \leq$ 100 kHz	V_n	-	60	-	Ω/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/ $^\circ\text{C}$

- 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.
- 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 Vdc -15 Vdc $\geq V_I \geq$ -25 Vdc	Reg_{line}	- -	5.0 3.0	80 50	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 5) 5.0 mA $\leq I_O \leq$ 500 mA	Reg_{load}	-	30	240	mV
Output Voltage -14.5 Vdc $\geq V_I \geq$ -30 Vdc, 5.0 mA $\leq I_O \leq$ 350 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 Vdc, $I_O = 350\text{ mA}$ 5.0 mA $\leq I_O \leq$ 350 mA, $V_I = -19\text{ V}$	ΔI_{IB}	- -	- -	0.4 0.4	mA
Output Noise Voltage, $T_A = 25^\circ\text{C}$, 10 Hz $\leq f \leq$ 100 kHz	V_n	-	75	-	Ω/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/ $^\circ\text{C}$

- 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.
- 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_{low} to T_{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_{line}	-	5.0 3.0	80 50	mV
Load Regulation, $T_J = 25^\circ\text{C}$ (Note 7) $5.0\text{ mA} \leq I_O \leq 500\text{ mA}$	Reg_{load}	-	30	240	mV
Output Voltage -17.5 Vdc $\geq V_I \geq$ -30 Vdc, $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$	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, $I_O = 350\text{ mA}$ $5.0\text{ mA} \leq I_O \leq 350\text{ mA}$, $V_I = -23\text{ V}$	ΔI_{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	-	90	-	Ω/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_{low} to T_{high} , $-40^\circ\text{C} < T_J < 125^\circ\text{C}$
C = T_{low} to T_{high} , $0^\circ\text{C} < T_J < 125^\circ\text{C}$

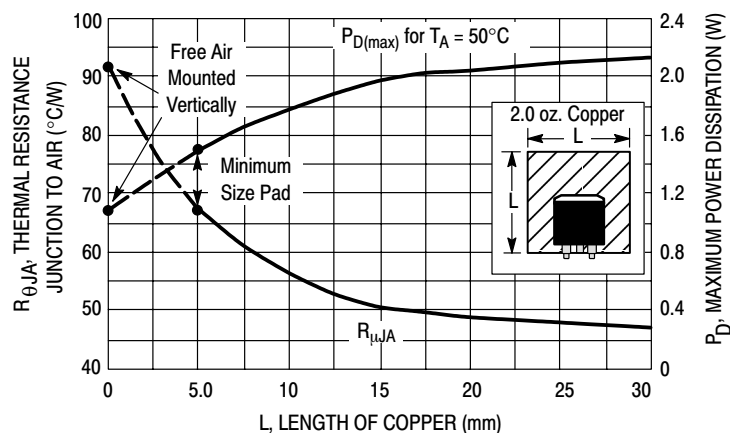


Figure 1. DPAK-3 Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

MC79M00 Series

ORDERING INFORMATION

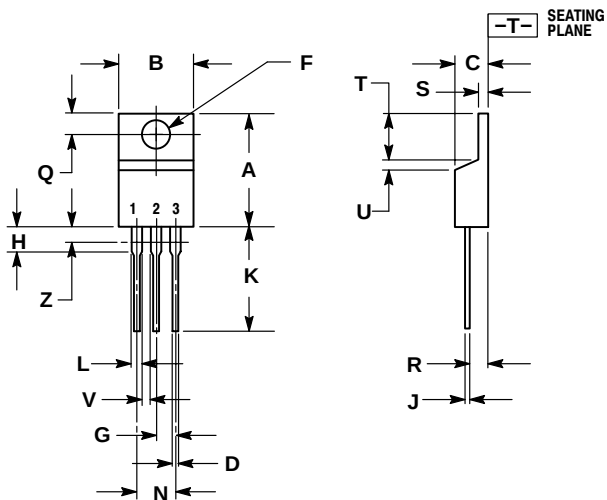
Device	Output Voltage Tolerance	Operating Temperature Range	Package	Shipping [†]
MC79M05BDT	4.0%	$T_J = -40^{\circ} \text{ to } +125^{\circ}\text{C}$	DPAK-3	75 Units / Rail
MC79M05BDTRK				2500 / Tape & Reel
MC79M05BT		$T_J = 0^{\circ} \text{ to } +125^{\circ}\text{C}$	TO-220-3	50 Units / Rail
MC79M05CDT			DPAK-3	75 Units / Rail
MC79M05CDTRK				2500 / Tape & Reel
MC79M05CT			TO-220-3	50 Units / Rail
MC79M05CTG			TO-220-3 (Pb-Free)	50 Units / Rail
MC79M08BDT		$T_J = -40^{\circ} \text{ to } +125^{\circ}\text{C}$	DPAK-3	75 Units / Rail
MC79M08BDTRK				2500 / Tape & Reel
MC79M08BT		$T_J = 0^{\circ} \text{ to } +125^{\circ}\text{C}$	TO-220-3	50 Units / Rail
MC79M08CDT			DPAK-3	75 Units / Rail
MC79M08CDTRK				2500 / Tape & Reel
MC79M08CT			TO-220-3	50 Units / Rail
MC79M12BDT		$T_J = -40^{\circ} \text{ to } +125^{\circ}\text{C}$	DPAK-3	75 Units / Rail
MC79M12BDTG			DPAK-3 (Pb-Free)	75 Units / Rail
MC79M12BDTRK			DPAK-3	2500 / Tape & Reel
MC79M12BT			TO-220-3	50 Units / Rail
MC79M12CDT		$T_J = 0^{\circ} \text{ to } +125^{\circ}\text{C}$	DPAK-3	75 Units / Rail
MC79M12CDTG			DPAK-3 (Pb-Free)	75 Units / Rail
MC79M12CDTRK			DPAK-3	2500 / Tape & Reel
MC79M12CT			TO-220-3	50 Units / Rail
MC79M12CTG			TO-220-3 (Pb-Free)	50 Units / Rail
MC79M15BDT		$T_J = -40^{\circ} \text{ to } +125^{\circ}\text{C}$	DPAK-3	75 Units / Rail
MC79M15BDTRK				2500 / Tape & Reel
MC79M15BT		$T_J = 0^{\circ} \text{ to } +125^{\circ}\text{C}$	TO-220-3	50 Units / Rail
MC79M15CDT			DPAK-3	75 Units / Rail
MC79M15CDTG			DPAK-3 (Pb-Free)	75 Units / Rail
MC79M15CDTRK			DPAK-3	2500 / Tape & Reel
MC79M15CDTRKG			DPAK-3 (Pb-Free)	2500 / Tape & Reel
MC79M15CT			DPAK-3	50 Units / Rail
MC79M15CTG			DPAK-3 (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
PLASTIC PACKAGE
T SUFFIX
CASE 221A-09
ISSUE AA



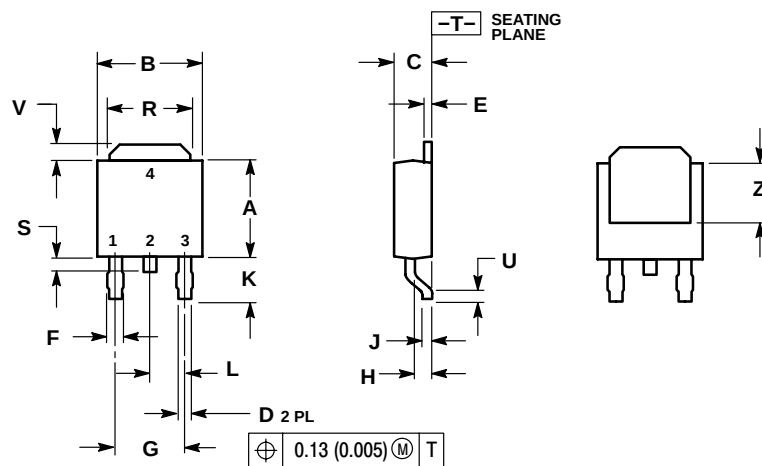
NOTES:

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
	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
	0.000	0.050	0.00	1.27
	0.045	---	1.15	---
	---	0.080	---	2.04

MC79M00 Series

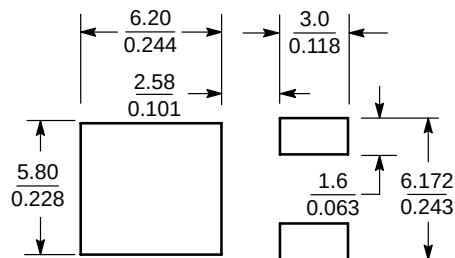
DDAK-3
DT SUFFIX
CASE 369C-01
ISSUE O



- 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.