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, –8.0, –12 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.

- 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

DEVICE TYPE/NOMINAL OUTPUT VOLTAGE

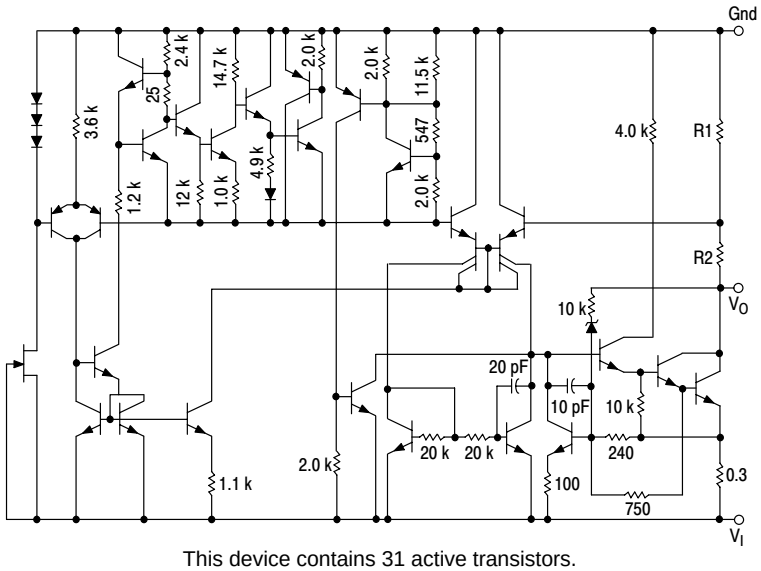
MC79M05 MC79M08	–5.0 V –8.0 V	MC79M12 MC79M15	–12 V –15 V

ORDERING INFORMATION

Device	Output Voltage Tolerance	Operating Temperature Range	Package
MC79MXXBDT, BDT–1	4.0%	T_J = –40° to +125°C	DPAK
MC79MXXBT			Plastic Power
MC79MXXCDT, CDT–1		T_J = 0° to +125°C	DPAK
MC79MXXCT			Plastic Power

XX indicates nominal voltage.

Representative Schematic Diagram



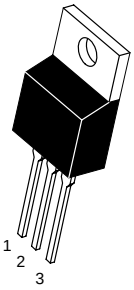
This device contains 31 active transistors.

MC79M00 Series

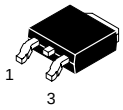
THREE–TERMINAL NEGATIVE FIXED VOLTAGE REGULATORS

T SUFFIX
PLASTIC PACKAGE
CASE 221A

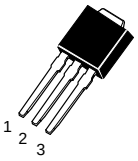
Heatsink surface connected to Pin 2.



Pin 1. Ground
2. Input
3. Output



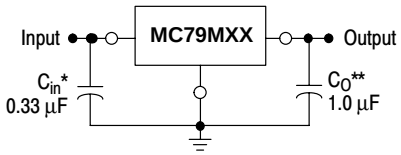
DT SUFFIX
PLASTIC PACKAGE
CASE 369A
(DPAK)



DT–1 SUFFIX
PLASTIC PACKAGE
CASE 369
(DPAK)

Heatsink surface (shown as terminal 4 in case outline drawing) is connected to Pin 2.

STANDARD APPLICATION



A common ground is required between the input and the output voltages. The input voltage must remain typically 1.1 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.

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

Rating	Symbol	Value	Unit
Input Voltage	V_I	–35	Vdc
Power Dissipation Case 221A T_A = 25°C Thermal Resistance, Junction–to–Ambient Thermal Resistance, Junction–to–Case Case 369 and 369A (DPAK) T_A = 25°C Thermal Resistance, Junction–to–Ambient Thermal Resistance, Junction–to–Case	 P_D θ_{JA} θ_{JC} P_D θ_{JA} θ_{JC}	 Internally Limited 65 5.0 Internally Limited 92 6.0	 W °C/W °C/W W °C/W °C/W
Storage Junction Temperature	T_{stg}	–65 to +150	°C
Junction Temperature	T_J	150	°C

NOTE: ESD data available upon request.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	65	°C/W
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	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	$\Delta V_O/\Delta T$	–	0.2	–	mV/°C

NOTES: 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

MC79M08B, 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	–7.7	–8.0	–8.3	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}	 – –	 5.0 3.0	 80 50	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	 –7.6	 –8.0	 –8.4	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	–	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	–	60	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	63	–	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	$\Delta V_O/\Delta T$	 –	 0.4	 –	mV/°C

MC79M12B, C
ELECTRICAL CHARACTERISTICS (V_I = –19 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	–11.5	–12	–12.5	Vdc
Line Regulation, T_J = 25°C (Note 1) –14.5 Vdc ≥ V_I ≥ –30 Vdc –15 Vdc ≥ V_I ≥ –25 Vdc	Reg_{line}	 – –	 5.0 3.0	 80 50	mV
Load Regulation, T_J = 25°C (Note 1) 5.0 mA ≤ I_O ≤ 500 mA	Reg_{load}	 –	 30	 240	mV
Output Voltage –14.5 Vdc ≥ V_I ≥ –30 Vdc, 5.0 mA ≤ I_O ≤ 350 mA	V_O	 –11.4	 –	 –12.6	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	4.4	8.0	mA
Input Bias Current Change –14.5 Vdc ≥ V_I ≥ –30 Vdc, I_O = 350 mA 5.0 mA ≤ I_O ≤ 350 mA, V_I = –19 V	ΔI_{IB}	 – –	 – –	 0.4 0.4	mA
Output Noise Voltage, T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V_n	–	75	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	60	–	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	$\Delta V_O/\Delta T$	 –	 –0.8	 –	mV/°C

NOTES: 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

MC79M15B, C

ELECTRICAL CHARACTERISTICS (V_I = –23 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	–14.4	–15	–15.6	Vdc
Line Regulation, T_J = 25°C (Note 1) –17.5 Vdc ≥ V_I ≥ –30 Vdc –18 Vdc ≥ V_I ≥ –28 Vdc	Reg_{line}	 – –	 5.0 3.0	 80 50	mV
Load Regulation, T_J = 25°C (Note 1) 5.0 mA ≤ I_O ≤ 500 mA	Reg_{load}	 –	 30	 240	mV
Output Voltage –17.5 Vdc ≥ V_I ≥ –30 Vdc, 5.0 mA ≤ I_O ≤ 350 mA	V_O	 –14.25	 –	 –15.75	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	4.4	8.0	mA
Input Bias Current Change –17.5 Vdc ≥ V_I ≥ –30 Vdc, I_O = 350 mA 5.0 mA ≤ I_O ≤ 350 mA, V_I = –23 V	ΔI_{IB}	 – –	 – –	 0.4 0.4	mA
Output Noise Voltage, T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V_n	–	90	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	60	–	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	$\Delta V_O/\Delta T$	 –	 –1.0	 –	mV/°C

NOTES: 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

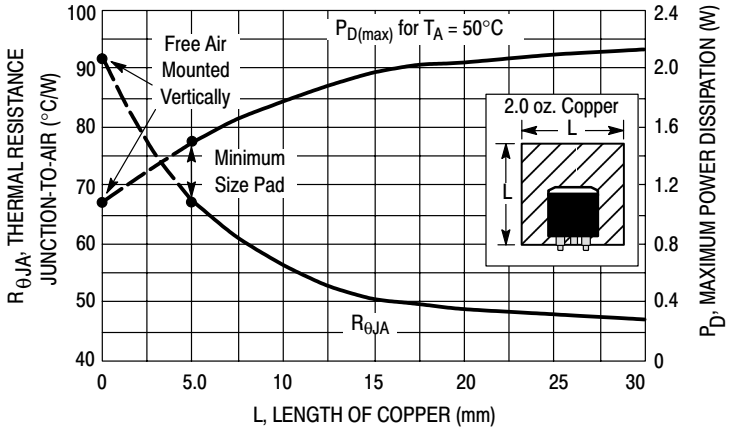
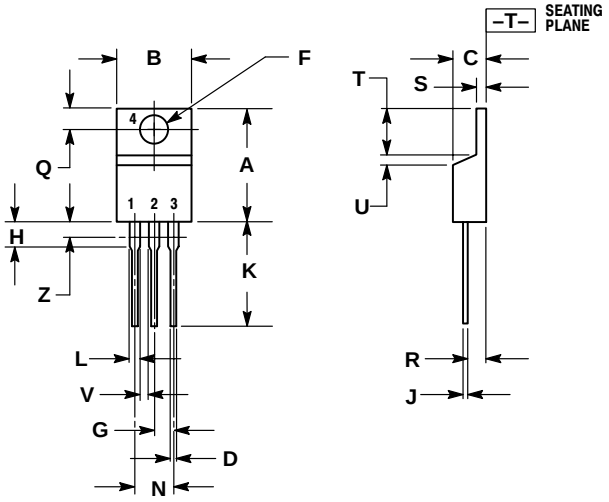


Figure 1. DPAK Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

PACKAGE DIMENSIONS

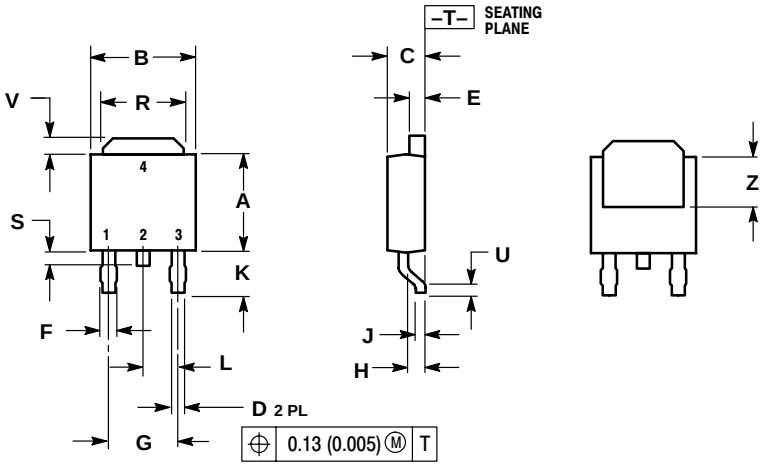
T SUFFIX
PLASTIC PACKAGE
CASE 221A–09
ISSUE AA



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.

	INCHES		MILLIMETERS	
DIM	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	0.045	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

DT SUFFIX
PLASTIC PACKAGE
CASE 369A–13
(DPAK)
ISSUE Z

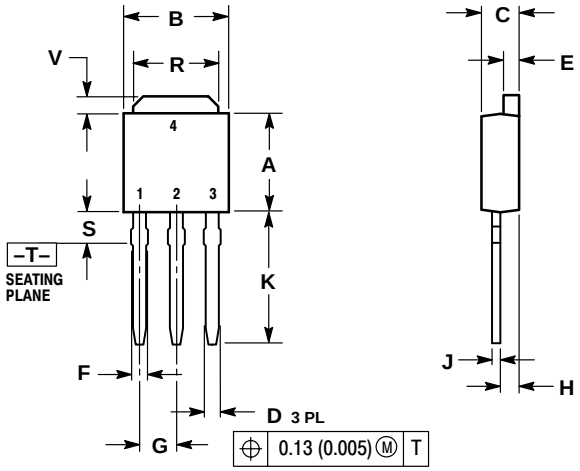


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	---	0.51	---
V	0.030	0.050	0.77	1.27
Z	0.138	---	3.51	---

PACKAGE DIMENSIONS

DT–1 SUFFIX
PLASTIC PACKAGE
CASE 369–07
(DPAK)
ISSUE M



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

Notes

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada
Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800–282–9855 Toll Free USA/Canada

JAPAN: ON Semiconductor, Japan Customer Focus Center
4–32–1 Nishi–Gotanda, Shinagawa–ku, Tokyo, Japan 141–0031
Phone: 81–3–5740–2700
Email: r14525@onsemi.com

ON Semiconductor Website: http://onsemi.com

For additional information, please contact your local Sales Representative.