



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

Rating	Symbol	Value	Unit
Input Voltage ( $-5.0\text{ V} \geq V_O \geq -18\text{ V}$ ) (24 V)	$V_I$	-35 -40	Vdc
<b>Power Dissipation</b> <b>Plastic Package</b> $T_A = +25^\circ\text{C}$ Derate above $T_A = +25^\circ\text{C}$ $T_C = +25^\circ\text{C}$ Derate above $T_C = +95^\circ\text{C}$ (See Figure 1)	$P_D$ $1/R_{\theta JA}$ $P_D$ $1/R_{\theta JC}$	Internally Limited 15.4 Internally Limited 200	Watts mW/ $^\circ\text{C}$ Watts mW/ $^\circ\text{C}$
<b>Metal Package</b> $T_A = +25^\circ\text{C}$ Derate above $T_A = +25^\circ\text{C}$ $T_C = +25^\circ\text{C}$ Derate above $T_C = +65^\circ\text{C}$	$P_D$ $1/R_{\theta JA}$ $P_D$ $1/R_{\theta JC}$	Internally Limited 22.2 Internally Limited 182	Watts mW/ $^\circ\text{C}$ Watts mW/ $^\circ\text{C}$
Storage Junction Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Junction Temperature Range	$T_J$	0 to +150	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient — Plastic Package — Metal Package	$R_{\theta JA}$	65 45	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case — Plastic Package — Metal Package	$R_{\theta JC}$	5.0 5.5	$^\circ\text{C}/\text{W}$

**MC7905C ELECTRICAL CHARACTERISTICS** ( $V_I = -10\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  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
<b>Line Regulation (Note 1)</b> ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) $-7.0\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $-8.0\text{ Vdc} \geq V_I \geq -12\text{ Vdc}$ ( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) $-7.0\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $-8.0\text{ Vdc} \geq V_I \geq -12\text{ Vdc}$	Reg <sub>line</sub>	— —	7.0 2.0	50 25	mV
<b>Load Regulation (<math>T_J = +25^\circ\text{C}</math>) (Note 1)</b> $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ $250\text{ mA} \leq I_O \leq 750\text{ mA}$	Reg <sub>load</sub>	— —	11 4.0	100 50	mV
Output Voltage $-7.0\text{ Vdc} \geq V_I \geq -20\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-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 $-7.0\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$	$\Delta I_{IB}$	— —	— —	1.3 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	40	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	70	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

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

**MC7905AC ELECTRICAL CHARACTERISTICS** ( $V_I = -10\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-4.9	-5.0	-5.1	Vdc
Line Regulation (Note 1) -8.0 Vdc $\geq V_I \geq -12\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$ -8.0 Vdc $\geq V_I \geq -12\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ -7.5 Vdc $\geq V_I \geq -25\text{ Vdc}$ ; $I_O = 500\text{ mA}$ -7.0 Vdc $\geq V_I \geq -20\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	Regline	—	2.0 7.0 7.0 6.0	25 50 60 50	mV
Load Regulation (Note 1) 5.0 mA $\leq I_O \leq 1.5\text{ A}$ , $T_J = +25^\circ\text{C}$ 250 mA $\leq I_O \leq 750\text{ mA}$ 5.0 mA $\leq I_O \leq 1.0\text{ A}$	Regload	—	11 4.0 9.0	.100 50 100	mV
Output Voltage -7.5 Vdc $\geq V_I \geq -20\text{ Vdc}$ , 5.0 mA $\leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-4.80	—	-5.20	Vdc
Input Bias Current	$I_{IB}$	—	4.4	8.0	mA
Input Bias Current Change -7.5 Vdc $\geq V_I \geq -25\text{ Vdc}$ 5.0 mA $\leq I_O \leq 1.0\text{ A}$ 5.0 mA $\leq I_O \leq 1.5\text{ A}$ , $T_J = 25^\circ\text{C}$	$\Delta I_{IB}$	—	—	1.3 0.5 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	40	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	70	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

**MC7905.2C ELECTRICAL CHARACTERISTICS** ( $V_I = -10\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-5.0	-5.2	-5.4	Vdc
Line Regulation (Note 1) ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) -7.2 Vdc $\geq V_I \geq -25\text{ Vdc}$ -8.0 Vdc $\geq V_I \geq -12\text{ Vdc}$  ( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) -7.2 Vdc $\geq V_I \geq -25\text{ Vdc}$ -8.0 Vdc $\geq V_I \geq -12\text{ Vdc}$	Regline	—	8.0 2.2 37 8.5	52 27 105 52	mV
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1) 5.0 mA $\leq I_O \leq 1.5\text{ A}$ 250 mA $\leq I_O \leq 750\text{ mA}$	Regload	—	12 4.5	105 52	mV
Output Voltage -7.2 Vdc $\geq V_I \geq -20\text{ Vdc}$ , 5.0 mA $\leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-4.95	—	-5.45	Vdc
Input Bias Current ( $T_J = +25^\circ\text{C}$ )	$I_{IB}$	—	4.3	8.0	mA
Input Bias Current Change -7.2 Vdc $\geq V_I \geq -25\text{ Vdc}$ 5.0 mA $\leq I_O \leq 1.5\text{ A}$	$\Delta I_{IB}$	—	—	1.3 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	42	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	68	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

## Note:

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

**MC7906C ELECTRICAL CHARACTERISTICS** ( $V_I = -11\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-5.75	-6.0	-6.25	Vdc
Line Regulation (Note 1) ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) $-8.0\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $-9.0\text{ Vdc} \geq V_I \geq -13\text{ Vdc}$ ( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) $-8.0\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $-9.0\text{ Vdc} \geq V_I \geq -13\text{ Vdc}$	Regline	—	9.0 3.0	60 30	mV
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1) $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ $250\text{ mA} \leq I_O \leq 750\text{ mA}$	Regload	—	13 5.0	120 60	mV
Output Voltage $-8.0\text{ Vdc} \geq V_I \geq -21\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-5.7	—	-6.3	Vdc
Input Bias Current ( $T_J = +25^\circ\text{C}$ )	$I_{IB}$	—	4.3	8.0	mA
Input Bias Current Change $-8.0\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$	$\Delta I_{IB}$	—	—	1.3 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	45	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	65	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

**MC7908C ELECTRICAL CHARACTERISTICS** ( $V_I = -14\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  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 (Note 1) ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) $-10.5\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $-11\text{ Vdc} \geq V_I \geq -17\text{ Vdc}$ ( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) $-10.5\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $-11\text{ Vdc} \geq V_I \geq -17\text{ Vdc}$	Regline	—	12 5.0	80 40	mV
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1) $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ $250\text{ mA} \leq I_O \leq 750\text{ mA}$	Regload	—	26 9.0	160 80	mV
Output Voltage $-10.5\text{ Vdc} \geq V_I \geq -23\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-7.6	—	-8.4	Vdc
Input Bias Current ( $T_J = +25^\circ\text{C}$ )	$I_{IB}$	—	4.3	8.0	mA
Input Bias Current Change $-10.5\text{ Vdc} \geq V_I \geq -25\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$	$\Delta I_{IB}$	—	—	1.0 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	52	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	62	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

## Note:

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

**MC7915C ELECTRICAL CHARACTERISTICS** ( $V_I = -23\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  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 (Note 1) ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) $-17.5\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ $-20\text{ Vdc} \geq V_I \geq -26\text{ Vdc}$	Reg <sub>line</sub>	—	14 6.0	150 75	mV
( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) $-17.5\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ $-20\text{ Vdc} \geq V_I \geq -26\text{ Vdc}$		—	57 27	300 150	
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1) $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ $250\text{ mA} \leq I_O \leq 750\text{ mA}$	Reg <sub>load</sub>	—	68 25	300 150	mV
Output Voltage $-17.5\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-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 $-17.5\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$	$\Delta I_{IB}$	—	—	1.0 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	90	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	60	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

**MC7915AC ELECTRICAL CHARACTERISTICS** ( $V_I = -23\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-14.7	-15	-15.3	Vdc
Line Regulation (Note 1) $-20\text{ Vdc} \geq V_I \geq -26\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$ $-20\text{ Vdc} \geq V_I \geq -26\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $-17.9\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ ; $I_O = 500\text{ mA}$ $-17.5\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$	Reg <sub>line</sub>	—	27 57 57 57	75 150 150 150	mV
Load Regulation (Note 1) $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ , $T_J = 25^\circ\text{C}$ $250\text{ mA} \leq I_O \leq 750\text{ mA}$ $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$	Reg <sub>load</sub>	—	68 25 40	150 75 150	mV
Output Voltage $-17.9\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$	$V_O$	-14.4	—	-15.6	Vdc
Input Bias Current	$I_{IB}$	—	4.4	8.0	mA
Input Bias Current Change $-17.5\text{ Vdc} \geq V_I \geq -30\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ , $T_J = 25^\circ\text{C}$	$\Delta I_{IB}$	—	—	0.8 0.5 0.5	mA
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	90	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	60	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

## Note:

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

**MC7912C ELECTRICAL CHARACTERISTICS** ( $V_I = -19\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  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 (Note 1)	Regline				mV
( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ )		—	13	120	
-14.5 Vdc $\geq V_I \geq -30\text{ Vdc}$		—	6.0	60	
-16 Vdc $\geq V_I \geq -22\text{ Vdc}$					
( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ )		—	55	240	
-14.5 Vdc $\geq V_I \geq -30\text{ Vdc}$		—	24	120	
-16 Vdc $\geq V_I \geq -22\text{ Vdc}$					
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1)	Regload				mV
$5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$		—	46	240	
$250\text{ mA} \leq I_O \leq 750\text{ mA}$		—	17	120	
Output Voltage	$V_O$	-11.4	—	-12.6	Vdc
-14.5 Vdc $\geq V_I \geq -27\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$					
Input Bias Current ( $T_J = +25^\circ\text{C}$ )	$I_{IB}$	—	4.4	8.0	mA
Input Bias Current Change	$\Delta I_{IB}$				mA
-14.5 Vdc $\geq V_I \geq -30\text{ Vdc}$		—	—	1.0	
$5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$		—	—	0.5	
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	75	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	61	—	dB
Dropout Voltage	$V_I - V_O$	—	2.0	—	Vdc
$I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$					
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	—	-1.0	—	mV/ $^\circ\text{C}$
$I_O = 5.0\text{ mA}$ , $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$					

**MC7912AC ELECTRICAL CHARACTERISTICS** ( $V_I = -19\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-11.75	-12	-12.25	Vdc
Line Regulation (Note 1)	Regline				mV
-16 Vdc $\geq V_I \geq -22\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$		—	6.0	60	
-16 Vdc $\geq V_I \geq -22\text{ Vdc}$ ; $I_O = 1.0\text{ A}$		—	24	120	
-14.8 Vdc $\geq V_I \geq -30\text{ Vdc}$ ; $I_O = 500\text{ mA}$		—	24	120	
-14.5 Vdc $\geq V_I \geq -27\text{ Vdc}$ ; $I_O = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$		—	13	120	
Load Regulation (Note 1)	Regload				mV
$5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ , $T_J = 25^\circ\text{C}$		—	46	150	
$250\text{ mA} \leq I_O \leq 750\text{ mA}$		—	17	75	
$5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$		—	35	150	
Output Voltage	$V_O$	-11.5	—	-12.5	Vdc
-14.8 Vdc $\geq V_I \geq -27\text{ Vdc}$ , $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P \leq 15\text{ W}$					
Input Bias Current	$I_{IB}$	—	4.4	8.0	mA
Input Bias Current Change	$\Delta I_{IB}$				mA
-15 Vdc $\geq V_I \geq -30\text{ Vdc}$		—	—	0.8	
$5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$		—	—	0.5	
$5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ , $T_J = 25^\circ\text{C}$		—	—	0.5	
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$e_{on}$	—	75	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	61	—	dB
Dropout Voltage	$V_I - V_O$	—	2.0	—	Vdc
$I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$					
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	—	-1.0	—	mV/ $^\circ\text{C}$
$I_O = 5.0\text{ mA}$ , $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$					

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

MC7918C ELECTRICAL CHARACTERISTICS ( $V_I = -27\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-17.3	-18	-18.7	Vdc
Line Regulation (Note 1) ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) -21 Vdc $\geq V_I \geq$ -33 Vdc -24 Vdc $\geq V_I \geq$ -30 Vdc	Reg <sub>line</sub>	—	25	180	mV
( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) -21 Vdc $\geq V_I \geq$ -33 Vdc -24 Vdc $\geq V_I \geq$ -30 Vdc		—	90	360	
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1) 5.0 mA $\leq I_O \leq$ 1.5 A 250 mA $\leq I_O \leq$ 750 mA	Reg <sub>load</sub>	—	110	360	mV
		—	55	180	
Output Voltage -21 Vdc $\geq V_I \geq$ -33 Vdc, 5.0 mA $\leq I_O \leq$ 1.0 A, $P \leq$ 15 W	$V_O$	-17.1	—	-18.9	Vdc
Input Bias Current ( $T_J = +25^\circ\text{C}$ )	$I_{IB}$	—	4.5	8.0	mA
Input Bias Current Change -21 Vdc $\geq V_I \geq$ -33 Vdc 5.0 mA $\leq I_O \leq$ 1.5 A	$\Delta I_{IB}$	—	—	1.0	mA
		—	—	0.5	
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , 10 Hz $\leq f \leq$ 100 kHz)	$e_{on}$	—	110	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	59	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

MC7924C ELECTRICAL CHARACTERISTICS ( $V_I = -33\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $0^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

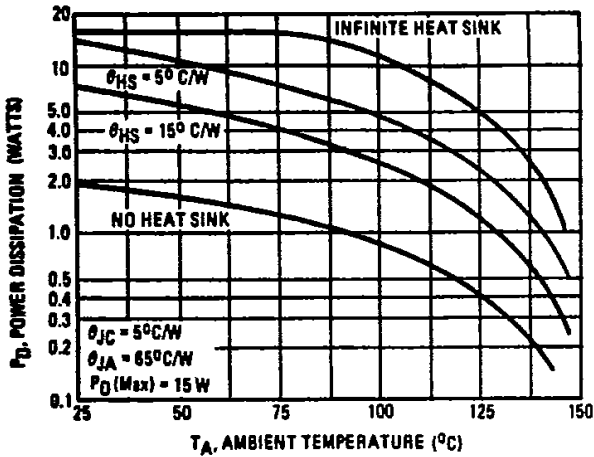
Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage ( $T_J = +25^\circ\text{C}$ )	$V_O$	-23	-24	-25	Vdc
Line Regulation (Note 1) ( $T_J = +25^\circ\text{C}$ , $I_O = 100\text{ mA}$ ) -27 Vdc $\geq V_I \geq$ -38 Vdc -30 Vdc $\geq V_I \geq$ -36 Vdc	Reg <sub>line</sub>	—	31	240	mV
( $T_J = +25^\circ\text{C}$ , $I_O = 500\text{ mA}$ ) -27 Vdc $\geq V_I \geq$ -38 Vdc -30 Vdc $\geq V_I \geq$ -36 Vdc		—	118	480	
Load Regulation ( $T_J = +25^\circ\text{C}$ ) (Note 1) 5.0 mA $\leq I_O \leq$ 1.5 A 250 mA $\leq I_O \leq$ 750 mA	Reg <sub>load</sub>	—	150	480	mV
		—	85	240	
Output Voltage -27 Vdc $\geq V_I \geq$ -38 Vdc, 5.0 mA $\leq I_O \leq$ 1.0 A, $P \leq$ 15 W	$V_O$	-22.8	—	-25.2	Vdc
Input Bias Current ( $T_J = +25^\circ\text{C}$ )	$I_{IB}$	—	4.6	8.0	mA
Input Bias Current Change -27 Vdc $\geq V_I \geq$ -38 Vdc 5.0 mA $\leq I_O \leq$ 1.5 A	$\Delta I_{IB}$	—	—	1.0	mA
		—	—	0.5	
Output Noise Voltage ( $T_A = +25^\circ\text{C}$ , 10 Hz $\leq f \leq$ 100 kHz)	$e_{on}$	—	170	—	$\mu\text{V}$
Ripple Rejection ( $I_O = 20\text{ mA}$ , $f = 120\text{ Hz}$ )	RR	—	56	—	dB
Dropout Voltage $I_O = 1.0\text{ A}$ , $T_J = +25^\circ\text{C}$	$V_I - V_O$	—	2.0	—	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/ $^\circ\text{C}$

## Note:

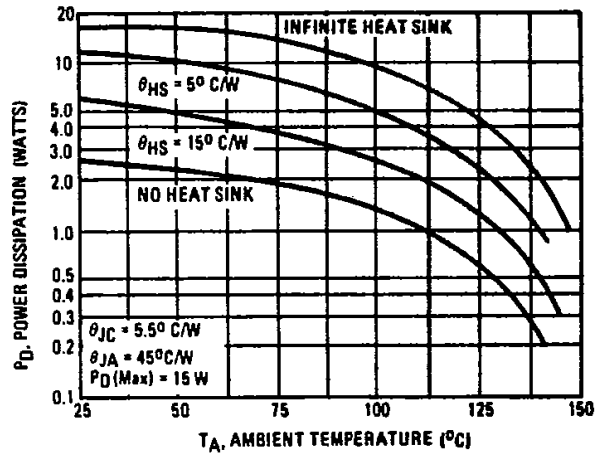
1. Load and line regulation are specified at constant junction temperature. Changes in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**TYPICAL CHARACTERISTICS**  
( $T_A = +25^\circ\text{C}$  unless otherwise noted.)

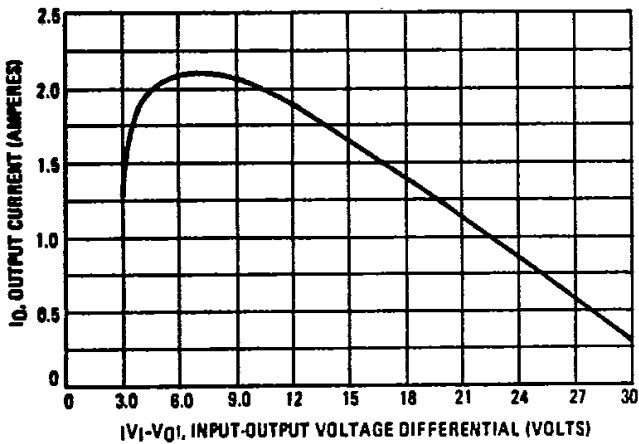
**FIGURE 1 – WORST CASE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE**



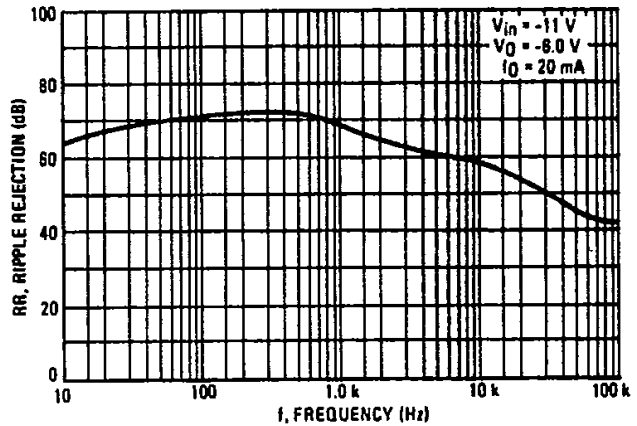
**FIGURE 2 – WORST CASE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE**



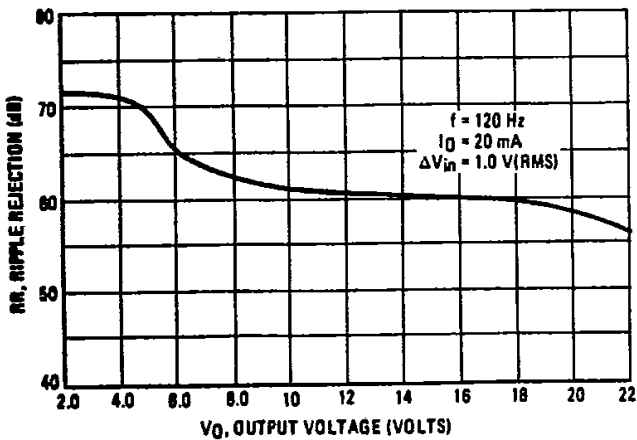
**FIGURE 3 – PEAK OUTPUT CURRENT AS A FUNCTION OF INPUT-OUTPUT DIFFERENTIAL VOLTAGE**



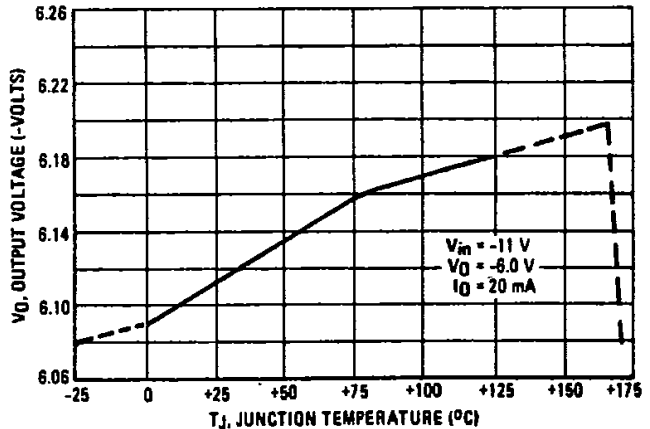
**FIGURE 4 – RIPPLE REJECTION AS A FUNCTION OF FREQUENCY**



**FIGURE 5 – RIPPLE REJECTION AS A FUNCTION OF OUTPUT VOLTAGES**



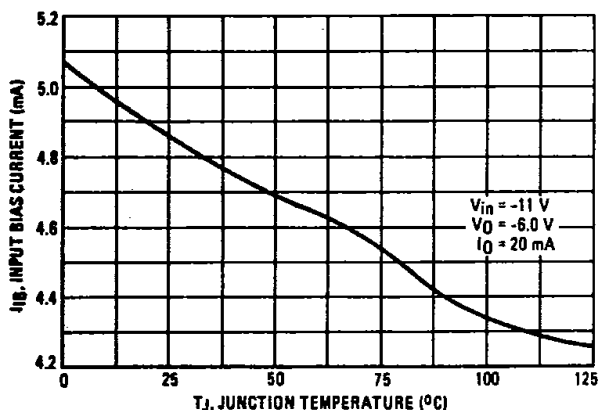
**FIGURE 6 – OUTPUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE**





TYPICAL CHARACTERISTICS (continued)

FIGURE 7 - QUIESCENT CURRENT AS A FUNCTION OF TEMPERATURE



DEFINITIONS

**Line Regulation** - The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

**Load Regulation** - The change in output voltage for a change in load current at constant chip temperature.

**Maximum Power Dissipation** - The maximum total device dissipation for which the regulator will operate within specifications.

**Input Bias Current** - That part of the input current that is not delivered to the load.

**Output Noise Voltage** - The rms ac voltage at the output, with constant load and no input ripple, measured over a specified frequency range.

**Long Term Stability** - Output voltage stability under accelerated life test conditions with the maximum rated voltage listed in the devices' electrical characteristics and maximum power dissipation.

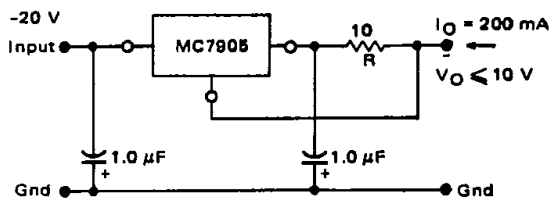
APPLICATIONS INFORMATION

Design Considerations

The MC7900 Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short-Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe-Area Compensation that reduces the output short-circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high-frequency characteristics to insure stable operation under all load conditions. A 0.33  $\mu\text{F}$  or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead. Bypassing the output is also recommended.

FIGURE 8 - CURRENT REGULATOR

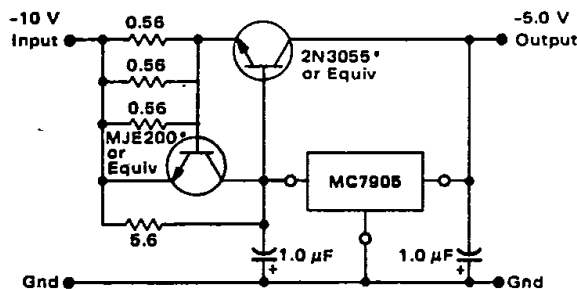


The MC7905, -5.0 V regulator can be used as a constant current source when connected as above. The output current is the sum of resistor R current and quiescent bias current as follows:

$$I_O = \frac{5.0\text{ V}}{R} + I_B$$

The quiescent current for this regulator is typically 4.3 mA. The 5.0 volt regulator was chosen to minimize dissipation and to allow the output voltage to operate to within 6.0 V below the input voltage.

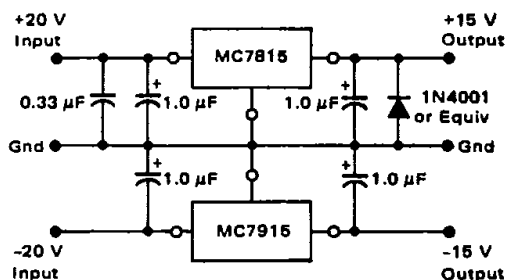
FIGURE 9 - CURRENT BOOST REGULATOR (-5.0 V @ 4.0 A, with 5.0 A current limiting)



\* Mounted on common heat sink, Motorola MS-10 or equivalent.

When a boost transistor is used, short-circuit currents are equal to the sum of the series pass and regulator limits, which are measured at 3.2 A and 1.8 A respectively in this case. Series pass limiting is approximately equal to  $0.6\text{ V}/R_{SC}$ . Operation beyond this point to the peak current capability of the MC7905C is possible if the regulator is mounted on a heat sink; otherwise thermal shutdown will occur when the additional load current is picked up by the regulator.

FIGURE 10 - OPERATIONAL AMPLIFIER SUPPLY ( $\pm 15\text{ V}$  @ 1.0 A)



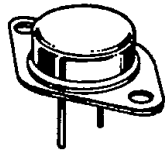
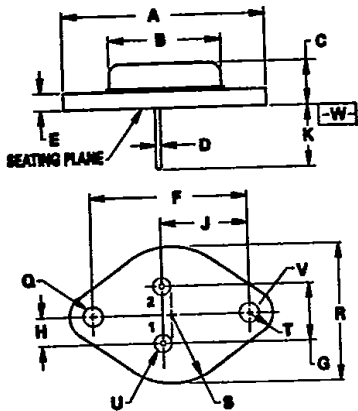
The MC7815 and MC7915 positive and negative regulators may be connected as shown to obtain a dual power supply for operational amplifiers. A clamp diode should be used at the output of the MC7815 to prevent potential latch-up problems whenever the output of the positive regulator (MC7815) is drawn below ground with an output current greater than 200 mA.

PACKAGE OUTLINE DIMENSIONS

**K SUFFIX  
METAL PACKAGE  
CASE 1-03  
R<sub>θJA</sub> = 45°C/W (TYP)  
(TO-3)**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
B	—	22.23	—	0.875
C	8.35	11.43	0.250	0.450
D	0.97	1.09	0.038	0.043
E	—	3.43	—	0.135
F	30.15 BSC	—	1.187 BSC	—
G	10.92 BSC	—	0.430 BSC	—
H	5.48 BSC	—	0.215 BSC	—
J	18.89 BSC	—	0.665 BSC	—
K	7.92	—	0.312	—
Q	3.84	4.09	0.151	0.161
S	—	13.34	—	0.525
T	—	4.78	—	0.188
V	3.84	4.09	0.151	0.161

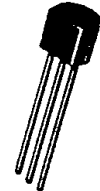
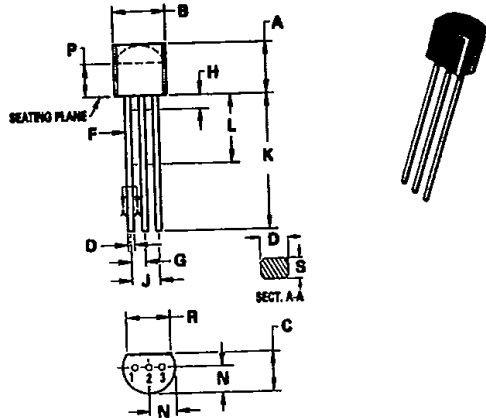
- NOTES:  
 1. DIAMETER V AND SURFACE W ARE DATUMS.  
 2. POSITIONAL TOLERANCE FOR HOLE Q:  
 Ⓢ Ⓢ 0.25 (0.010) Ⓢ | W | V Ⓢ  
 3. POSITIONAL TOLERANCE FOR LEADS:  
 Ⓢ Ⓢ 0.30 (0.012) Ⓢ | W | V Ⓢ | Q Ⓢ



**LP, P, Z SUFFIX  
PLASTIC PACKAGE  
CASE 29-04  
R<sub>θJA</sub> = 200°C/W (TYP)  
(TO-226AA/TO-92)**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.32	5.33	0.170	0.210
B	4.45	5.20	0.175	0.205
C	3.18	4.19	0.125	0.165
D	0.41	0.55	0.016	0.022
F	0.41	0.48	0.016	0.019
G	1.15	1.39	0.045	0.055
H	—	2.54	—	0.100
J	2.42	2.66	0.095	0.105
K	12.70	—	0.500	—
L	6.35	—	0.250	—
N	2.04	2.68	0.080	0.105
P	2.93	—	0.115	—
R	3.43	—	0.135	—
S	0.39	0.50	0.015	0.020

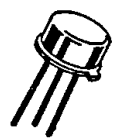
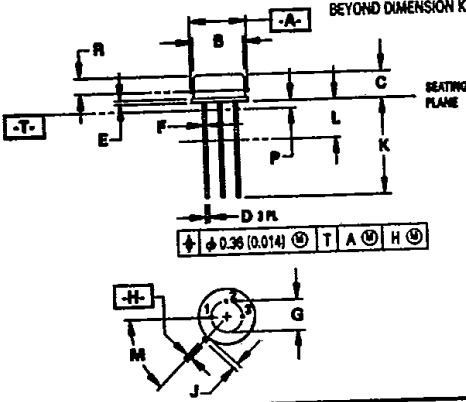
- NOTES:  
 1. CONTOUR OF PACKAGE BEYOND ZONE "P" IS UNCONTROLLED.  
 2. DIM "F" APPLIES BETWEEN "H" AND "L". DIM "D" & "S" APPLIES BETWEEN "L" & 12.70mm (0.5") FROM SEATING PLANE. LEAD DIM IS UNCONTROLLED IN "H" & BEYOND 12.70mm (0.5") FROM SEATING PLANE.  
 3. CONTROLLING DIM: INCH.



**G, H SUFFIX  
METAL PACKAGE  
CASE 79-05  
R<sub>θJA</sub> = 185°C/W (TYP)  
(TO-39)**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.02	9.29	0.355	0.368
B	8.01	8.50	0.315	0.335
C	4.20	4.57	0.165	0.180
D	0.44	0.53	0.017	0.021
E	0.44	0.88	0.017	0.035
F	0.41	0.48	0.016	0.019
G	5.08 BSC	—	0.200 BSC	—
H	0.72	0.96	0.028	0.034
J	0.74	1.01	0.029	0.040
K	12.70	19.05	0.500	0.750
L	6.35	—	0.250	—
M	45° BSC	—	45° BSC	—
P	—	1.27	—	0.050
R	2.54	—	0.100	—

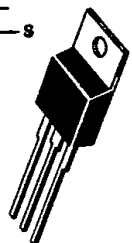
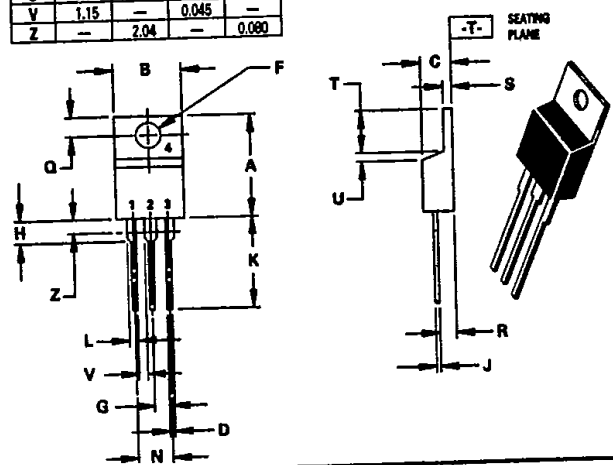
- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.  
 3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.  
 4. DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.  
 5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.



**KC, T SUFFIX  
PLASTIC PACKAGE  
CASE 221A-04  
R<sub>θJA</sub> = 65°C/W (TYP)  
(TO-220AB)**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.68	10.28	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.88	0.025	0.035
F	3.01	3.73	0.142	0.147
G	2.42	2.68	0.095	0.105
H	2.90	3.93	0.110	0.155
J	0.96	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.79	0.080	0.110
S	1.15	1.39	0.045	0.055
T	6.97	8.47	0.235	0.255
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.04	—	0.080

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

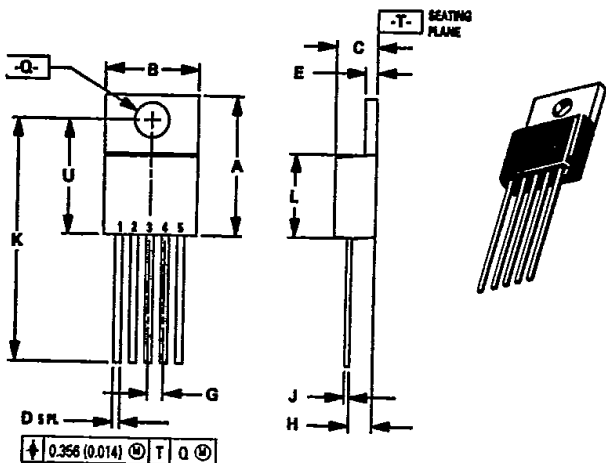


# PACKAGE OUTLINE DIMENSIONS (continued)

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.529	15.570	0.572	0.613
B	9.908	10.541	0.390	0.415
C	4.318	4.572	0.170	0.180
D	0.635	0.965	0.025	0.038
E	1.169	1.397	0.046	0.055
G	1.702 BSC		0.067 BSC	
H	2.109	2.717	0.083	0.107
J	0.381	0.635	0.015	0.025
K	25.907	26.670	1.016	1.050
L	8.052	9.398	0.317	0.370
Q	3.556	3.937	0.140	0.155
U	11.889	12.827	0.468	0.505

## T SUFFIX PLASTIC PACKAGE CASE 314D-02

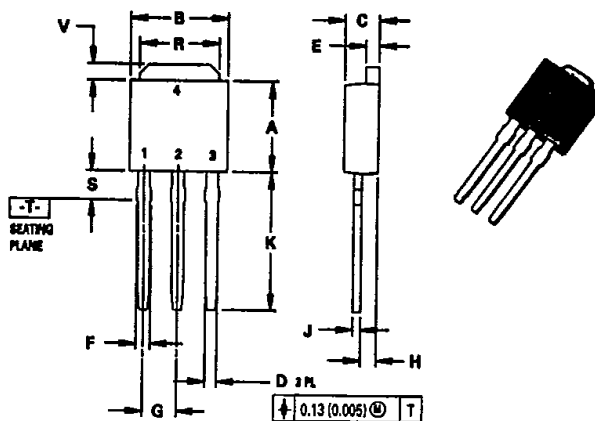
- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.97	6.22	0.235	0.245
B	6.35	6.73	0.250	0.265
C	2.19	2.38	0.086	0.094
D	0.69	0.88	0.027	0.035
E	0.84	0.94	0.033	0.037
F	0.77	1.14	0.030	0.045
G	2.29 BSC		0.090 BSC	
H	0.97	1.06	0.038	0.042
J	0.46	0.58	0.018	0.023
K	8.89	9.65	0.350	0.380
R	5.21	5.46	0.205	0.215
S	1.91	2.28	0.075	0.090
V	0.89	1.27	0.035	0.050

## DT-1 SUFFIX PLASTIC PACKAGE CASE 369-03

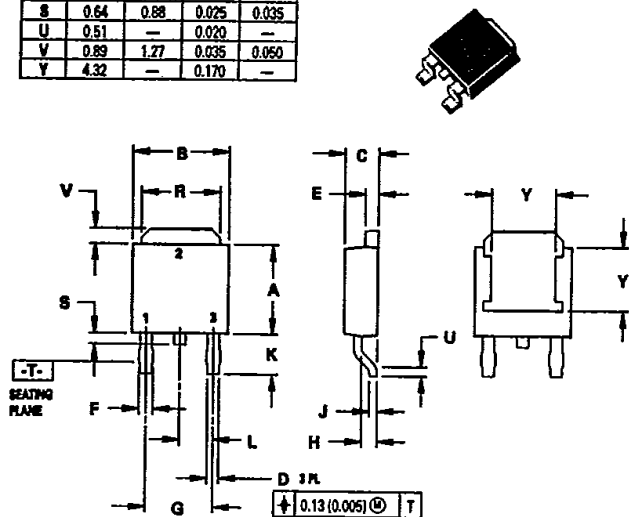
- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.97	6.22	0.235	0.245
B	6.35	6.73	0.250	0.265
C	2.19	2.38	0.086	0.094
D	0.69	0.88	0.027	0.035
E	0.84	0.94	0.033	0.037
F	0.77	1.14	0.030	0.045
G	4.58 BSC		0.180 BSC	
H	0.97	1.06	0.038	0.042
J	0.46	0.58	0.018	0.023
K	2.60	2.89	0.102	0.114
L	2.29 BSC		0.090 BSC	
R	5.21	5.46	0.205	0.215
S	0.64	0.88	0.025	0.035
U	0.51	—	0.020	—
V	0.89	1.27	0.035	0.050
Y	4.32	—	0.170	—

## DT SUFFIX PLASTIC PACKAGE CASE 369A-03 DPAK

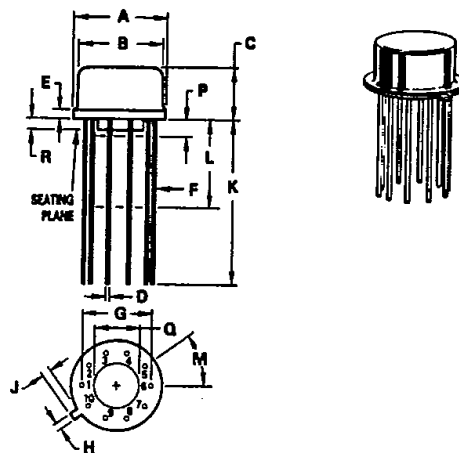
- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.75	8.51	0.305	0.335
C	4.19	4.70	0.165	0.185
D	0.407	0.533	0.016	0.021
E	—	1.02	—	0.040
F	0.406	0.483	0.016	0.019
G	5.84 BSC		0.230 BSC	
H	0.712	0.864	0.028	0.034
J	0.737	1.14	0.029	0.045
K	12.70	—	0.500	—
L	6.35	12.70	0.250	0.500
M	36° BSC		36° BSC	
P	—	1.27	—	0.050
Q	3.56	4.06	0.140	0.160
R	0.254	1.02	0.010	0.040

## H, G SUFFIX METAL PACKAGE CASE 603-04 $R_{\theta JA} = 160^{\circ}\text{C/W}$ (TO-100)

- NOTE:  
LEADS WITHIN 0.18 mm (0.007) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.



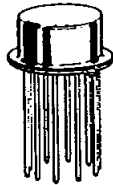
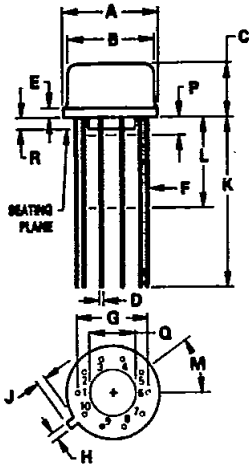
All JEDEC Dimensions and Notes Apply.

# PACKAGE OUTLINE DIMENSIONS (continued)

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.75	8.51	0.306	0.335
C	4.19	6.73	0.165	0.265
D	0.407	0.533	0.018	0.021
E	—	1.02	—	0.040
F	0.408	0.483	0.018	0.019
G	5.84 BSC	—	0.230 BSC	—
H	0.712	0.864	0.028	0.034
J	0.737	1.14	0.029	0.045
K	12.70	—	0.500	—
L	6.35	12.70	0.250	0.500
M	36° BSC	—	36° BSC	—
P	—	1.27	—	0.050
Q	3.56	4.08	0.140	0.160
R	0.254	1.02	0.010	0.040

## G SUFFIX METAL PACKAGE CASE 603C-01 $R_{\theta JA} = 150^{\circ}\text{C/W}$ (TYP) (TO-100)

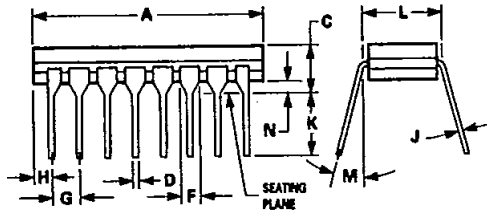
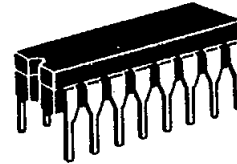
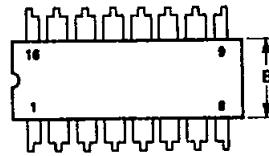
- NOTES:
- LEADS WITHIN 0.18 mm (0.007) RADIUS OF TRUE POSITION TO DIM. "A" & "H" AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
  - LEAD DIA UNCONTROLLED BEYOND DIM "K" MIN.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.94	0.750	0.785
B	6.10	7.49	0.240	0.295
C	—	5.08	—	0.200
D	0.38	0.53	0.015	0.021
F	1.40	1.78	0.055	0.070
G	2.54 BSC	—	0.100 BSC	—
H	0.51	1.14	0.020	0.045
J	0.20	0.30	0.008	0.012
K	3.18	4.32	0.125	0.170
L	7.62 BSC	—	0.300 BSC	—
M	—	15°	—	15°
N	0.51	1.02	0.020	0.040

## DP2, D, J, L, N SUFFIX CERAMIC PACKAGE CASE 620-10 $R_{\theta JA} = 100^{\circ}\text{C/W}$ (TYP)

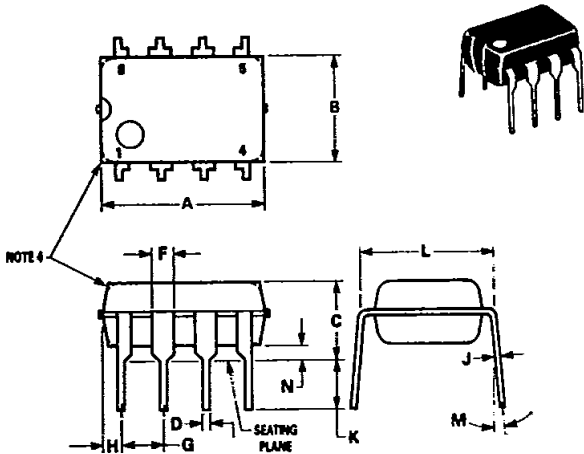
- NOTES:
- LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
  - PACKAGE INDEX: NOTCH IN LEAD NOTCH IN CERAMIC OR INK DOT.
  - DIM "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
  - DIM "A" AND "B" DO NOT INCLUDE GLASS RUN-OUT.
  - DIM "F" MAY NARROW TO 0.76 mm (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.



## N, P1 SUFFIX PLASTIC PACKAGE CASE 626-05 $R_{\theta JA} = 100^{\circ}\text{C/W}$ (TYP)

- NOTES:
- LEAD POSITIONAL TOLERANCE:  
 $\pm 0.13$  (0.005) (M) T A (M) B (M)
  - DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  - PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
  - DIMENSIONS A AND B ARE DATUMS.
  - DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

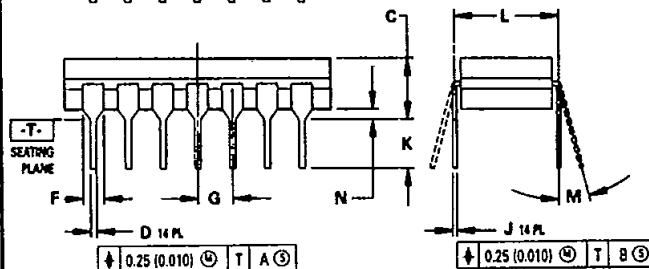
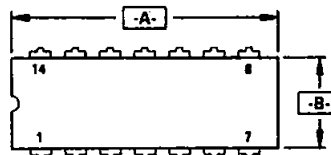
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.52	0.040	0.060
G	2.54 BSC	—	0.100 BSC	—
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC	—	0.300 BSC	—
M	—	10°	—	10°
N	0.76	1.01	0.030	0.040



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.94	0.750	0.785
B	8.23	7.11	0.245	0.280
C	3.94	5.08	0.155	0.200
D	0.39	0.50	0.015	0.020
F	1.40	1.65	0.055	0.065
G	2.54 BSC	—	0.100 BSC	—
J	0.21	0.38	0.008	0.015
K	3.18	4.31	0.125	0.170
L	7.62 BSC	—	0.300 BSC	—
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

## L SUFFIX CERAMIC PACKAGE CASE 632-08 $R_{\theta JA} = 100^{\circ}\text{C/W}$ (TYP) (TO-116)

- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: INCH.
  - DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  - DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.



# PACKAGE OUTLINE DIMENSIONS (continued)

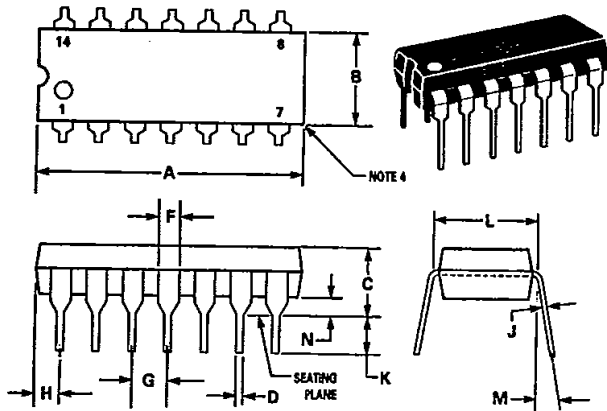
## N, P, N-14, P2 SUFFIX PLASTIC PACKAGE CASE 646-06

$R_{\theta JA} = 100^{\circ}\text{C/W (TYP)}$

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.16	19.58	0.715	0.770
B	6.10	6.60	0.240	0.260
C	3.69	4.69	0.145	0.185
D	0.38	0.53	0.015	0.021
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.32	2.41	0.052	0.095
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	10°	0°	10°
N	0.39	1.01	0.015	0.039

**NOTES:**

- LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
- DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
- DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
- ROUNDED CORNERS OPTIONAL.



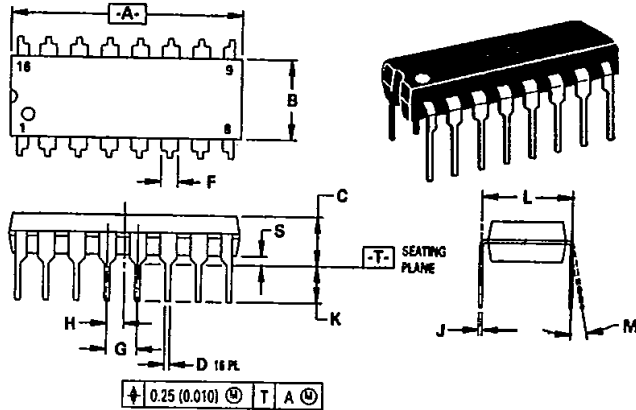
## N, P SUFFIX PLASTIC PACKAGE CASE 648-08

$R_{\theta JA} = 100^{\circ}\text{C/W (TYP)}$

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	19.65	0.740	0.770
B	6.35	6.85	0.250	0.270
C	3.69	4.44	0.145	0.175
D	0.39	0.53	0.015	0.021
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.27 BSC		0.050 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.30	0.110	0.130
L	7.50	7.74	0.295	0.305
M	0°	10°	0°	10°
S	0.51	1.01	0.020	0.040

**NOTES:**

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
- DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
- ROUNDED CORNERS OPTIONAL.

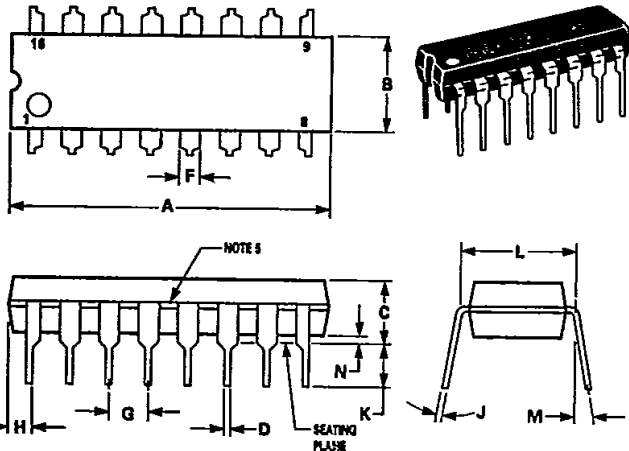


## P SUFFIX PLASTIC PACKAGE CASE 648C-02

**NOTES:**

- LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
- DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
- DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
- ROUNDED CORNERS OPTIONAL.
- EXTERNAL LEAD CONNECTION, BETWEEN 4 AND 5, 12 AND 13 AS SHOWN.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	21.34	0.740	0.840
B	6.10	6.60	0.240	0.260
C	3.69	4.69	0.145	0.185
D	0.38	0.53	0.015	0.021
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.38	2.41	0.015	0.095
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	10°	0°	10°
N	0.39	1.01	0.015	0.040



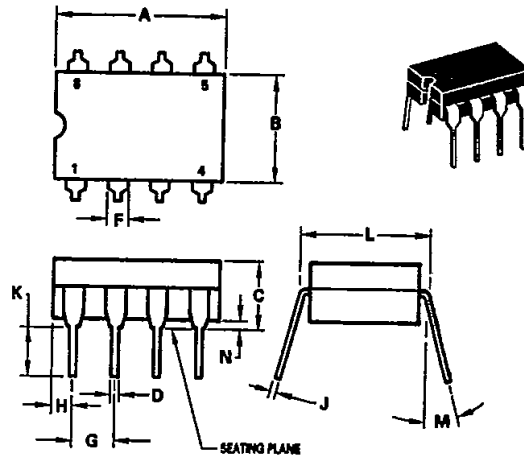
## J-8, J, JG, U, Z SUFFIX CERAMIC PACKAGE CASE 693-02

$R_{\theta JA} = 100^{\circ}\text{C/W (TYP)}$

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.91	10.92	0.390	0.430
B	6.22	6.99	0.245	0.275
C	4.32	5.08	0.170	0.200
D	0.41	0.51	0.016	0.020
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
H	1.14	1.65	0.045	0.065
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	7.37	7.87	0.290	0.310
M	—	15°	—	15°
N	0.51	1.02	0.020	0.040

**NOTES:**

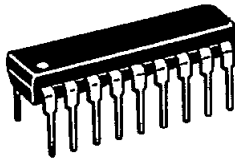
- LEADS WITHIN 0.13 mm (0.005) RAD OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
- DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.



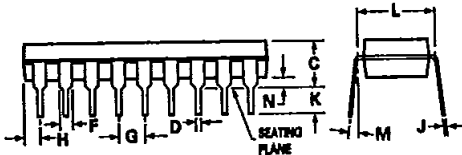
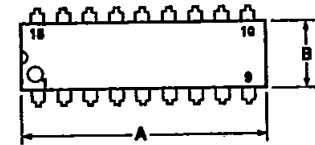
# PACKAGE OUTLINE DIMENSIONS (continued)

## A, B, N, P SUFFIX PLASTIC PACKAGE CASE 707-02 $R_{\theta JA} = 100^{\circ}\text{C/W (TYP)}$

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.22	23.24	0.875	0.915
B	8.10	6.60	0.240	0.260
C	3.56	4.57	0.140	0.180
D	0.36	0.56	0.014	0.022
F	1.27	1.78	0.050	0.070
G	2.54 BSC		0.100 BSC	
H	1.02	1.52	0.040	0.060
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040



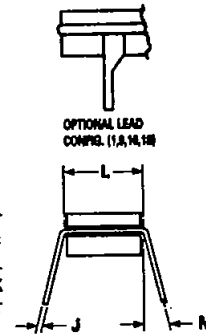
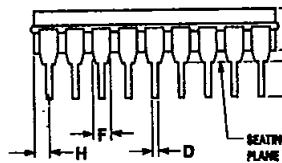
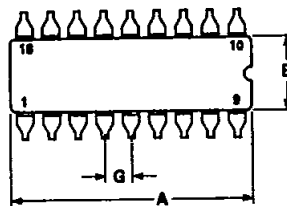
- NOTES:
1. POSITIONAL TOLERANCE OF LEADS (D), SHALL BE WITHIN 0.25mm(0.010) AT MAXIMUM MATERIAL CONDITION, IN RELATION TO SEATING PLANE AND EACH OTHER.
  2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIMENSION B DOES NOT INCLUDE MOLD FLASH.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.35	23.11	0.880	0.910
B	6.10	7.49	0.240	0.295
C	—	5.08	—	0.200
D	0.38	0.53	0.015	0.021
F	1.40	1.78	0.055	0.070
G	2.54 BSC		0.100 BSC	
H	0.51	1.14	0.020	0.045
J	0.20	0.30	0.008	0.012
K	3.18	4.32	0.125	0.170
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040

## J, L SUFFIX CERAMIC PACKAGE CASE 726-04 $R_{\theta JA} = 100^{\circ}\text{C/W (TYP)}$

- NOTES:
1. LEADS, TRUE POSITIONED WITHIN 0.25 mm (0.010) DIA. AT SEATING PLANE, AT MAXIMUM MATERIAL CONDITION.
  2. DIM "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIM "A" & "B" INCLUDES MENISCUS.
  4. "F" DIMENSION IS FOR FULL LEADS. "HALF" LEADS ARE OPTIONAL AT LEAD POSITIONS 1, 9, 10, AND 18.

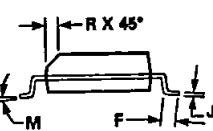
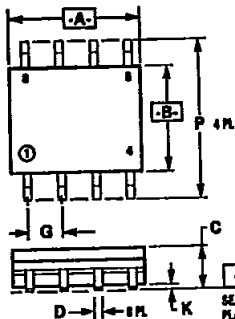


## D SUFFIX CASE 751-03 PLASTIC PACKAGE SO-8, SOP-8 $R_{\theta JA} = 190^{\circ}\text{C/W (SO-8)}$ $R_{\theta JA} = 160^{\circ}\text{C/W (SOP-8)}$

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.00	0.193	0.196
B	3.90	4.00	0.150	0.157
C	1.36	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.90	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019



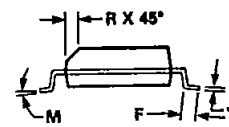
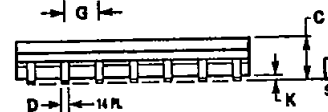
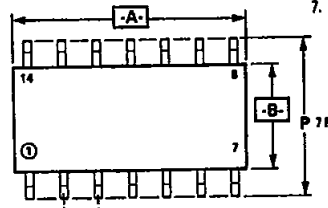
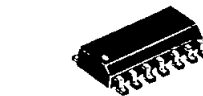
- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
  2. POSITIONAL TOLERANCE FOR D DIMENSION (8 PLACES):  
 $\pm 0.25 (0.010) \text{ (M)} \text{ T B (M)} \text{ A (M)}$
  3. POSITIONAL TOLERANCE FOR P DIMENSION (4 PLACES):  
 $\pm 0.25 (0.010) \text{ (M)} \text{ B (M)}$
  4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  5. CONTROLLING DIMENSION: MILLIMETER.
  6. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  7. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.



## D SUFFIX PLASTIC PACKAGE CASE 751A-02 SO-14 $R_{\theta JA} = 145^{\circ}\text{C/W (TYP)}$

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.90	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

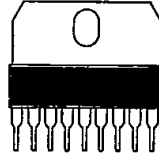
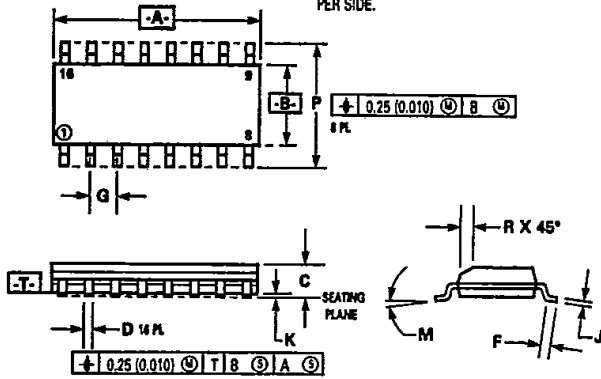
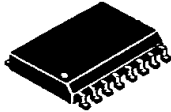
- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
  2. POSITIONAL TOLERANCE FOR D DIMENSION (14 PLACES):  
 $\pm 0.25 (0.010) \text{ (M)} \text{ T B (M)} \text{ A (M)}$
  3. POSITIONAL TOLERANCE FOR P DIMENSION (7 PLACES):  
 $\pm 0.25 (0.010) \text{ (M)} \text{ B (M)}$
  4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  5. CONTROLLING DIMENSION: MILLIMETER.
  6. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  7. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.15	10.45	0.400	0.411
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.06	10.55	0.396	0.415
	0.25	0.75	0.010	0.029

**DW SUFFIX  
PLASTIC PACKAGE  
CASE 751G-01  
SO-16L**

- NOTES:
- DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
  - DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: MILLIMETER.
  - DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  - MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.



**CASE 762-01  
PLASTIC MEDIUM  
POWER PACKAGE  
SIP-9**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.40	23.00	0.873	0.897
B	6.40	6.60	0.252	0.260
C	3.65	3.85	0.145	0.149
D	0.40	0.55	0.015	0.021
E	0.35	0.40	0.008	0.015
F	1.40	1.60	0.055	0.062
G	2.54 BSC		0.100 BSC	
H	1.51	1.71	0.059	0.067
J	0.380	0.460	0.014	0.018
K	3.95	4.20	0.155	0.165
M	30° BSC		30° BSC	
N	2.50	2.70	0.099	0.106
Q	3.15	3.45	0.124	0.136
R	13.80	13.90	0.543	0.547
S	1.65	1.95	0.064	0.076
U	22.00	22.20	0.866	0.874
V	0.55	0.75	0.021	0.029
W	2.65 BSC		0.113 BSC	
X	0.65	0.75	0.025	0.029
Y	2.70	2.80	0.106	0.110

- NOTES:
- DIMENSIONS A, AND C ARE DATUMS. AND -T- IS A DATUM PLANE.
  - POSITIONAL TOLERANCE FOR LEAD DIMENSION D:  
 $\pm 0.25 (0.010) \text{ (M) } | -T | A \text{ (M)}$
  - POSITIONAL TOLERANCE FOR LEAD DIMENSION J:  
 $\pm 0.25 (0.010) \text{ (M) } | -T | C \text{ (M)}$
  - POSITIONAL TOLERANCE FOR LEAD DIMENSION Q:  
 $\pm 0.25 (0.010) \text{ (M) } | -T | A \text{ (M)}$
  - DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1982.
  - CONTROLLING DIMENSION: MILLIMETER.

