



# H78XX Series

## 3-TERMINAL POSITIVE VOLTAGE REGULATORS

### Description

The H78XX series can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each employs internal current limiting, thermal shut-down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

### Features

- Output Current In Excess of 1A
- Output Voltages of 5V, 6V, 8V, 9V, 12V
- Internal Short-Circuit Current Limiting & Thermal Overload Protection
- Guaranteed In Extended Temperature Range

### Absolute Maximum Ratings (T<sub>A</sub>=25°C)

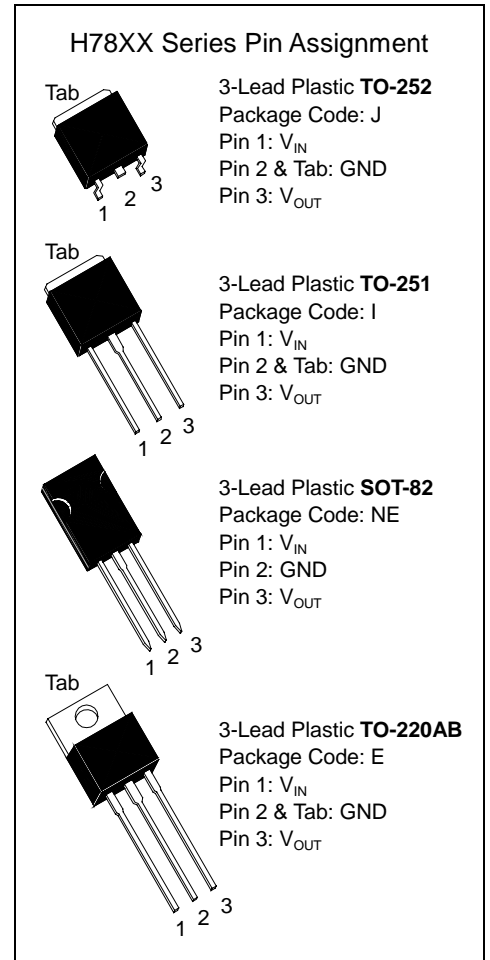
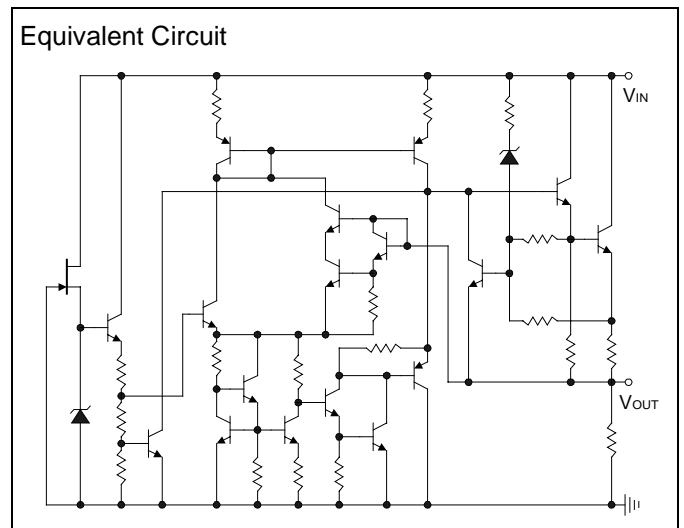
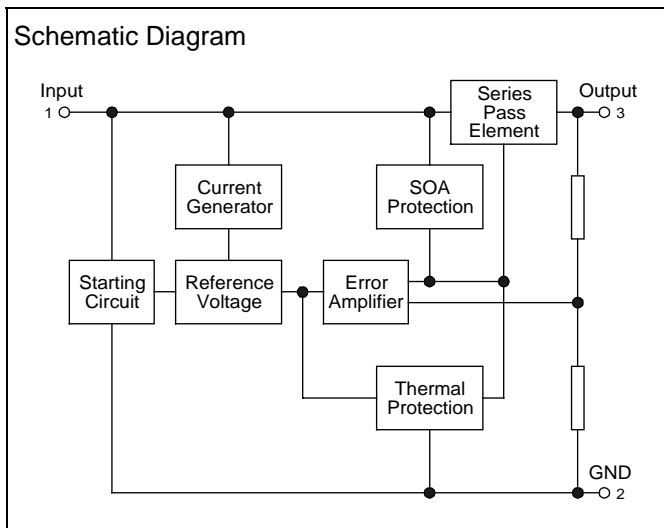
Characteristic	Symbol	Rating	Unit
Input Voltage	V <sub>IN</sub>	40	V
Power Dissipation	P <sub>D</sub>	Internally limited (Note)	
Operating Temperature	T <sub>opr</sub>	-30 to 85	°C
Storage Temperature	T <sub>stg</sub>	-55 to 150	°C
Junction Temperature	T <sub>j</sub>	150	°C

Note: (1)T<sub>A</sub>=25°C, TO-251: 1W, TO-252: 1W, SOT-82: 2.1W, TO-220AB: 2.7W  
 (2)T<sub>C</sub>=25°C, All package: 10W

### Thermal Data

Characteristic	Symbol	TO-252	TO-251	SOT-82	TO-220AB	Unit
Thermal Resistance Junction-Case	R <sub>th(j-c)</sub>	12.5	12.5	12.5	12.5	°C/W
Thermal Resistance Junction-Ambient	R <sub>th(j-a)</sub>	125	125	60	47	°C/W

### Schematic Diagram & Equivalent Circuit





### H7805 Series Electrical Characteristics

$V_{IN}=10V$ ,  $I_{OUT}=500mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Conditions	H7805AJ/AI/ANE/AE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	4.85	5	5.15	V
		$5mA \leq I_{OUT} \leq 1A$	4.85	5	5.15	
		$7V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $7V \leq V_{IN} \leq 25V$	-	3	50	mV
		$T_J=25^{\circ}C$ , $8V \leq V_{IN} \leq 12V$	-	1	25	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	100	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	50	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $7V \leq V_{IN} \leq 25V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=10V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	50	-	$\mu V/V_O$
RR	Ripple Rejection	$10V \leq V_{IN} \leq 18V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	57	73	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	0.6	$mV/^{\circ}C$

Symbol	Parameter	Conditions	H7805BJ/BI/BNE/BE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	4.75	5	5.25	V
		$5mA \leq I_{OUT} \leq 1A$	4.75	5	5.25	
		$7V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $7V \leq V_{IN} \leq 25V$	-	3	100	mV
		$T_J=25^{\circ}C$ , $8V \leq V_{IN} \leq 12V$	-	1	50	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	100	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	50	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $7V \leq V_{IN} \leq 25V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=10V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	50	-	$\mu V/V_O$
RR	Ripple Rejection	$10V \leq V_{IN} \leq 18V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	57	73	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	0.6	$mV/^{\circ}C$



### H7806 Series Electrical Characteristics

$V_{IN}=11V$ ,  $I_{OUT}=500mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Conditions	H7806AJ/AI/ANE/AE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	5.82	6	6.18	V
		$5mA \leq I_{OUT} \leq 1A$	5.82	6	6.18	
		$8V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $8V \leq V_{IN} \leq 25V$	-	3	60	mV
		$T_J=25^{\circ}C$ , $9V \leq V_{IN} \leq 13V$	-	1	25	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	100	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	50	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $9V \leq V_{IN} \leq 25V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=11V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	55	$\mu V/V_O$
RR	Ripple Rejection	$11V \leq V_{IN} \leq 19V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	56	72	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$V_{IN}=45V$ , $T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	0.7	$mV/^{\circ}C$

Symbol	Parameter	Conditions	H7806BJ/BI/BNE/BE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	5.7	6	6.3	V
		$5mA \leq I_{OUT} \leq 1A$	5.7	6	6.3	
		$8V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $8V \leq V_{IN} \leq 25V$	-	3	120	mV
		$T_J=25^{\circ}C$ , $9V \leq V_{IN} \leq 13V$	-	1	60	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	120	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	60	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $9V \leq V_{IN} \leq 25V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=11V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	55	$\mu V/V_O$
RR	Ripple Rejection	$11V \leq V_{IN} \leq 19V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	56	72	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$V_{IN}=45V$ , $T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	0.7	$mV/^{\circ}C$



### H7808 Series Electrical Characteristics

$V_{IN}=14V$ ,  $I_{OUT}=500mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Conditions	H7808AJ/AI/ANE/AE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	7.76	8	8.24	V
		$5mA \leq I_{OUT} \leq 1A$	7.76	8	8.24	
		$10V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $10.5V \leq V_{IN} \leq 25V$	-	3	80	mV
		$T_J=25^{\circ}C$ , $11V \leq V_{IN} \leq 17V$	-	1	40	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	100	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	50	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $10.5V \leq V_{IN} \leq 25V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=14V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	70	$\mu V/V_O$
RR	Ripple Rejection	$14V \leq V_{IN} \leq 21.5V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	53	69	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	1	$mV/^{\circ}C$

Symbol	Parameter	Conditions	H7808BJ/BI/BNE/BE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	7.6	8	8.4	V
		$5mA \leq I_{OUT} \leq 1A$	7.6	8	8.4	
		$10V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $10.5V \leq V_{IN} \leq 25V$	-	3	160	mV
		$T_J=25^{\circ}C$ , $11V \leq V_{IN} \leq 17V$	-	1	80	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	160	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	80	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $10.5V \leq V_{IN} \leq 25V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=14V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	70	$\mu V/V_O$
RR	Ripple Rejection	$14V \leq V_{IN} \leq 21.5V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	53	69	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	1	$mV/^{\circ}C$



### H7809 Series Electrical Characteristics

$V_{IN}=15V$ ,  $I_{OUT}=500mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Conditions	H7809AJ/AI/ANE/AE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	8.73	9	9.27	V
		$5mA \leq I_{OUT} \leq 1A$	8.73	9	9.27	
		$11V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $11.5V \leq V_{IN} \leq 25V$	-	3	90	mV
		$T_J=25^{\circ}C$ , $13V \leq V_{IN} \leq 19V$	-	1	45	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	100	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	50	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $11.5V \leq V_{IN} \leq 26V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=15V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	75	$\mu V/V_O$
RR	Ripple Rejection	$15V \leq V_{IN} \leq 22.5V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	51	67	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	1.1	$mV/^{\circ}C$

Symbol	Parameter	Conditions	H7809BJ/BI/BNE/BE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	8.55	9	9.45	V
		$5mA \leq I_{OUT} \leq 1A$	8.55	9	9.45	
		$11V \leq V_{IN} \leq 25V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $11.5V \leq V_{IN} \leq 25V$	-	3	180	mV
		$T_J=25^{\circ}C$ , $13V \leq V_{IN} \leq 19V$	-	1	90	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	15	180	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	5	90	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $11.5V \leq V_{IN} \leq 26V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=15V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	75	$\mu V/V_O$
RR	Ripple Rejection	$15V \leq V_{IN} \leq 22.5V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	51	67	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	17	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	1.1	$mV/^{\circ}C$



### H7812 Series Electrical Characteristics

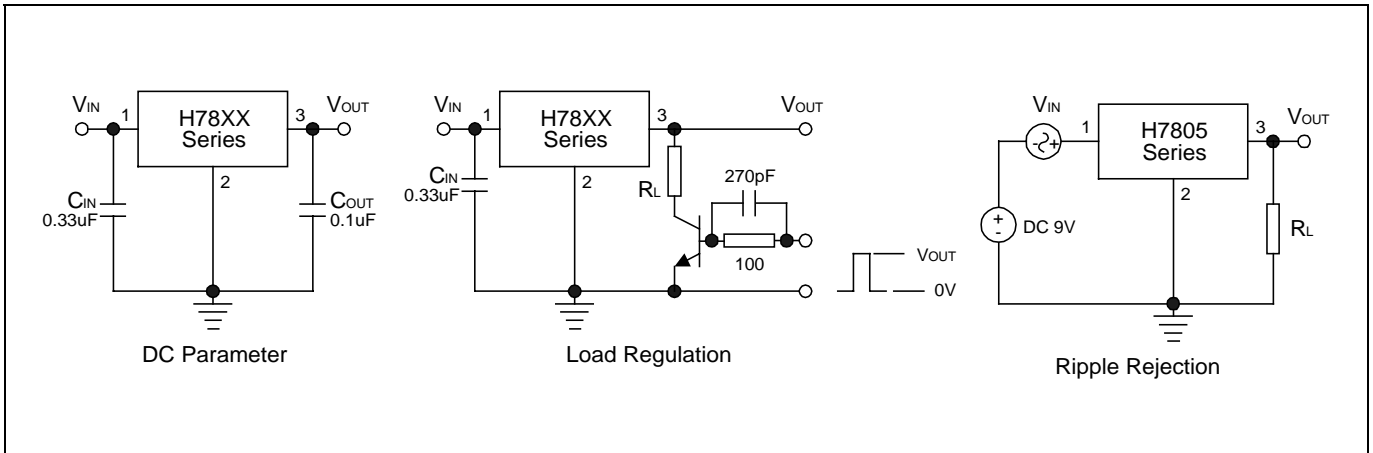
$V_{IN}=19V$ ,  $I_{OUT}=500mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Conditions	H7812AJ/AI/ANE/AE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	11.64	12	12.36	V
		$5mA \leq I_{OUT} \leq 1A$	11.64	12	12.36	
		$14V \leq V_{IN} \leq 30V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $14.5V \leq V_{IN} \leq 30V$	-	10	120	mV
		$T_J=25^{\circ}C$ , $16V \leq V_{IN} \leq 22V$	-	3	60	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	12	100	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	4	60	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $14.5V \leq V_{IN} \leq 30V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=19V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	90	$\mu V/V_O$
RR	Ripple Rejection	$19V \leq V_{IN} \leq 25V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	50	66	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	18	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	1.6	$mV/^{\circ}C$

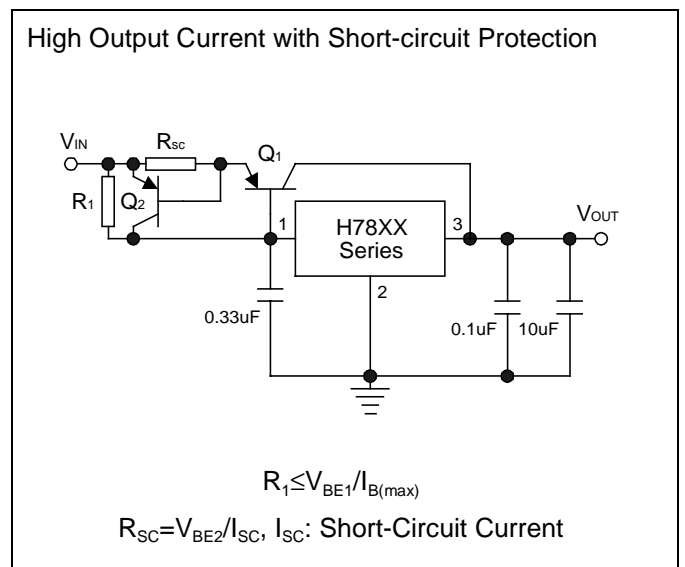
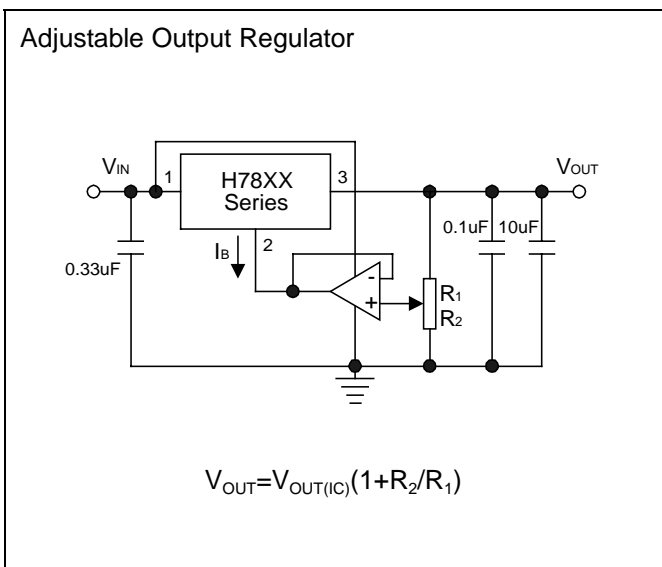
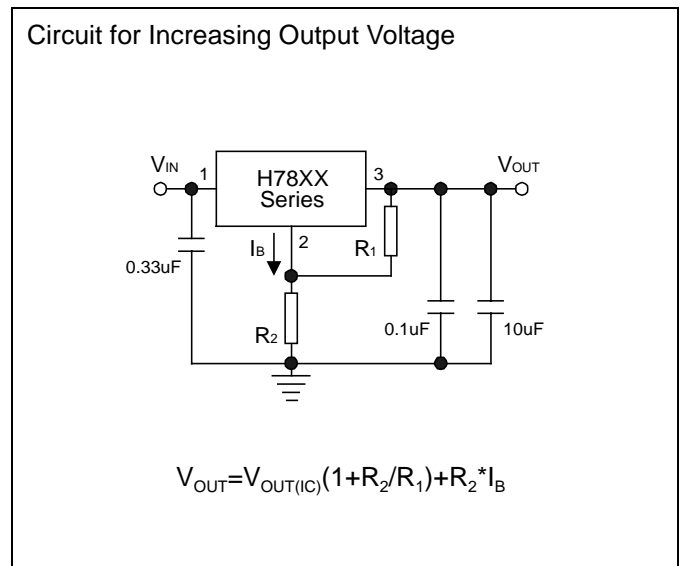
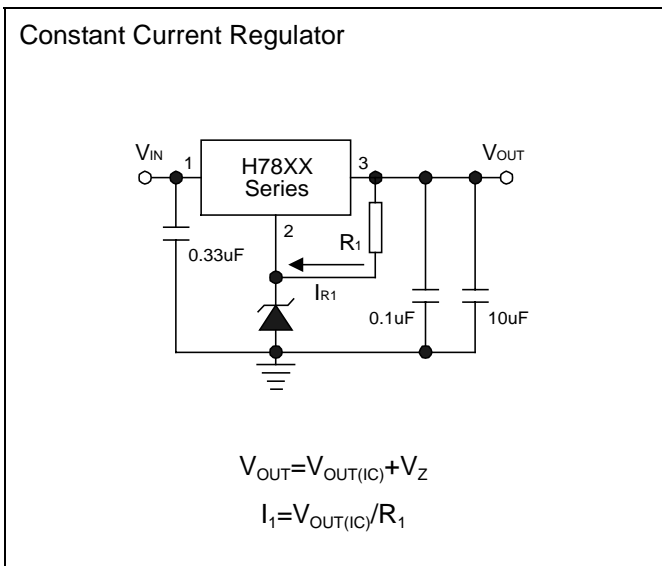
Symbol	Parameter	Conditions	H7812BJ/BI/BNE/BE			Units
			Min	Typ	Max	
$V_O$	Output Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=500mA$	11.4	12	12.6	V
		$5mA \leq I_{OUT} \leq 1A$	11.4	12	12.6	
		$14V \leq V_{IN} \leq 30V$ , $P_{OUT} \leq 15W$				
$\Delta V_O$	Line Regulation	$T_J=25^{\circ}C$ , $14.5V \leq V_{IN} \leq 30V$	-	10	240	mV
		$T_J=25^{\circ}C$ , $16V \leq V_{IN} \leq 22V$	-	3	120	
$\Delta V_O$	Load Regulation	$T_J=25^{\circ}C$ , $5mA \leq I_{OUT} \leq 1A$	-	12	240	mV
		$T_J=25^{\circ}C$ , $250mA \leq I_{OUT} \leq 750mA$	-	4	120	
$I_B$	Quiescent Current	$I_{OUT}=5mA$ , $T_J=25^{\circ}C$	-	3.9	8	mA
$\Delta I_B$	Quiescent Current Change	$I_{OUT}=500mA$ , $14.5V \leq V_{IN} \leq 30V$ , $T_J=25^{\circ}C$	-	-	1.3	mA
		$5mA \leq I_{OUT} \leq 1A$ , $V_{IN}=19V$ , $T_J=25^{\circ}C$	-	-	0.5	
eN	Output Noise Voltage	$B=10Hz \sim 100KHz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	-	-	90	$\mu V/V_O$
RR	Ripple Rejection	$19V \leq V_{IN} \leq 25V$ , $f=120Hz$ , $I_{OUT}=50mA$ , $T_J=25^{\circ}C$	50	66	-	dB
$V_D$	Dropout Voltage	$T_J=25^{\circ}C$ , $I_{OUT}=1A$	-	2	2.5	V
$R_O$	Output Resistance	$f=1KHz$	-	18	-	$m\Omega$
$I_{SC}$	Short Circuit Current	$T_J=25^{\circ}C$	-	2.3	2.8	A
$\Delta V_O/\Delta T$	Output Voltage Drift	$0^{\circ}C \leq T_J \leq 125^{\circ}C$	-	-	1.6	$mV/^{\circ}C$



### Test Circuits

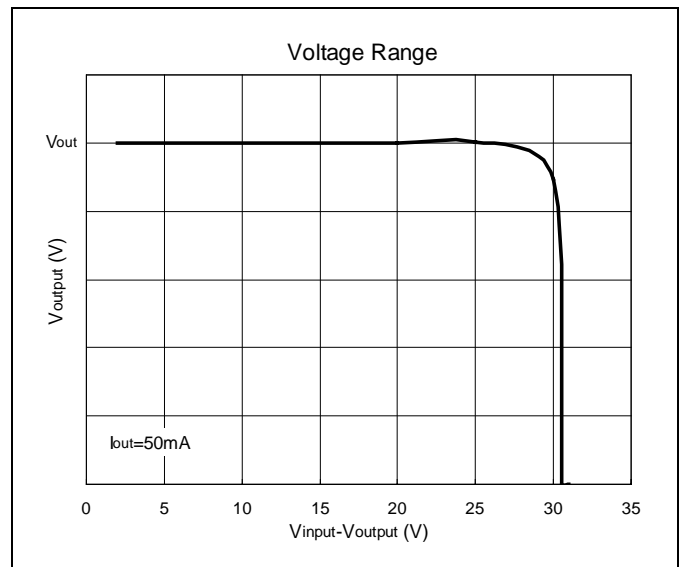
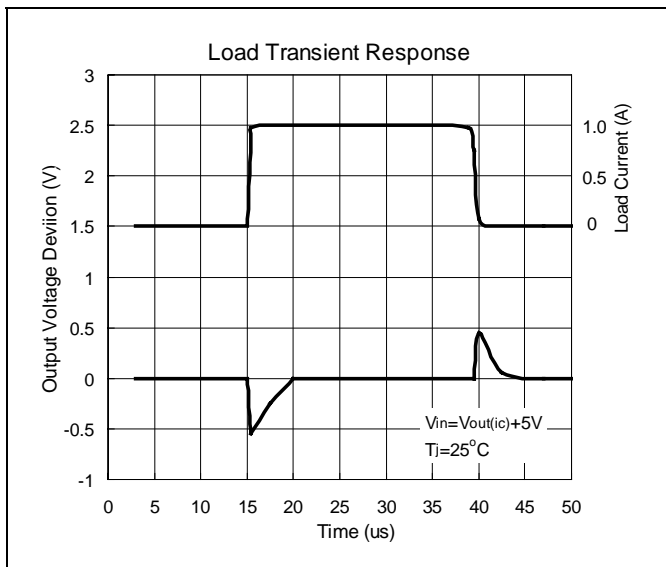
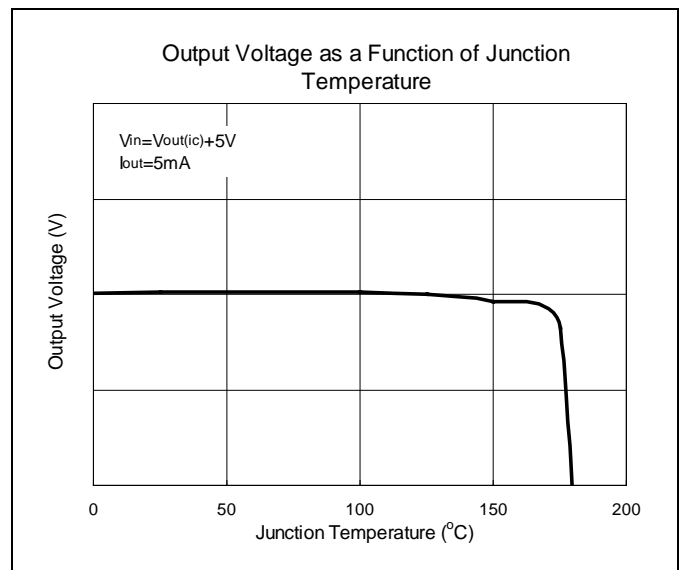
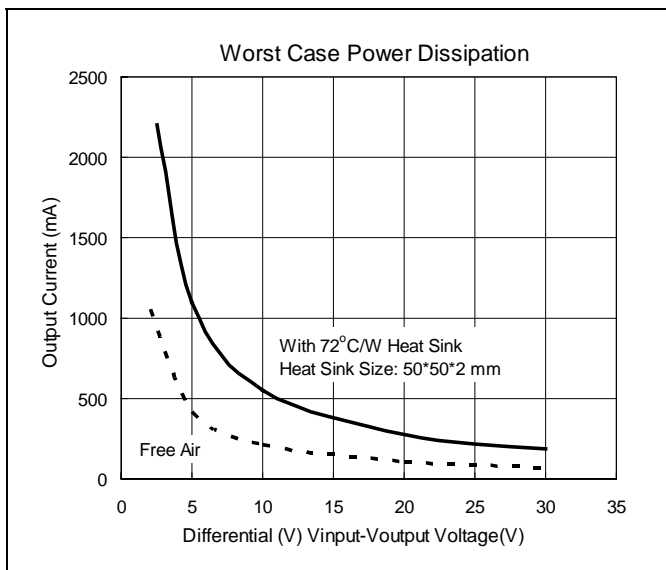
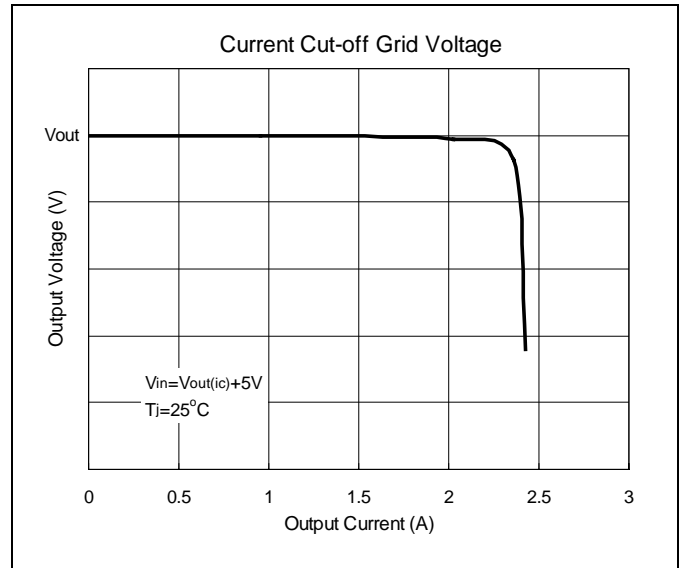
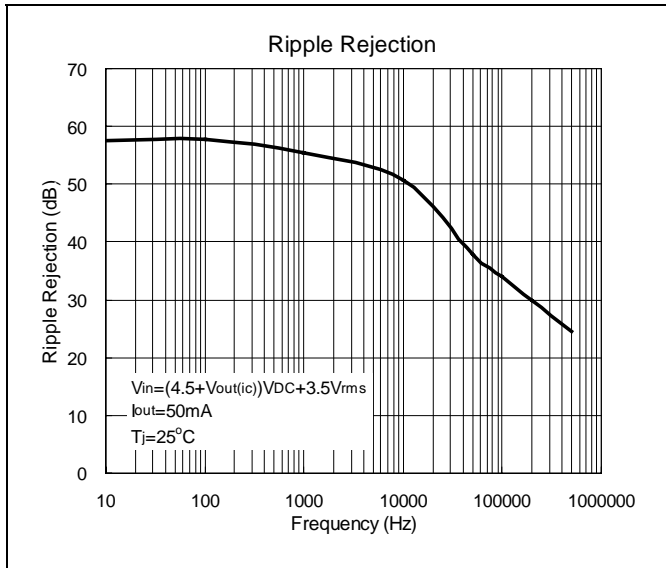


### Application Circuits





### Characteristics Curve







### TO-252 Dimension

3-Lead TO-252 Plastic  
Surface Mount Package  
HSMC Package Code: J

**Marking:**

Pb Free Mark  
 Pb-Free: "•" (Note)  
 Normal: None

Date Code      Control Code

Product Series (05,06,08,09,12)

Note: Green label is used for pb-free packing

Pin Style: 1.Input 2.Ground 3.Output

**Material:**

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.35	6.80
C	4.80	5.50
F	1.30	1.70
G	5.40	6.25
H	2.20	3.00
L	0.40	0.90
M	2.20	2.40
N	0.90	1.50
a1	0.40	0.65
a2	-	*2.30
a5	0.65	1.05

\*: Typical, Unit: mm

3-Lead TO-252 Plastic  
Surface Mount Package  
HSMC Package Code: J

**Marking:**

Pb Free Mark  
 Pb-Free: "•" (Note)  
 Normal: None

Date Code      Control Code

Product Series (05,06,08,09,12)

Note: Green label is used for pb-free packing

Pin Style: 1.Input 2.Ground 3.Output

**Material:**

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.40	6.80
B	-	6.00
C	5.04	5.64
D	-	*4.34
E	0.40	0.80
F	0.50	0.90
G	5.90	6.30
H	2.50	2.90
I	9.20	9.80
J	0.60	1.00
K	-	0.96
L	0.66	0.86
M	2.20	2.40
N	0.70	1.10
O	0.82	1.22
a1	0.40	0.60
a2	2.10	2.50
y1	-	5°
y2	-	3°

\*: Typical, Unit: mm



### TO-251 Dimension

**Marking:**

Pb Free Mark  
 Pb-Free: "•" (Note)  
 Normal: None

Date Code      Control Code

Note: Green label is used for pb-free packing

Pin Style: 1.Input 2.Ground 3.Output

**Material:**

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.35	6.80
C	4.80	5.50
F	1.30	1.70
G	5.40	6.25
H1	6.75	8.00
K	0.50	0.90
K1	0.40	0.90
L	0.90	1.50
M	2.20	2.40
a1	0.40	0.65
a2	-	*2.30

\*: Typical, Unit: mm

**3-Lead TO-251  
Plastic Package  
HSMC Package Code: I**

**Marking:**

Pb Free Mark  
 Pb-Free: "•" (Note)  
 Normal: None

Date Code      Control Code

Note: Green label is used for pb-free packing

Pin Style: 1.Input 2.Ground 3.Output

**Material:**

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.40	6.80
B	-	6.00
C	5.04	5.64
D	-	*4.34
E	0.40	0.80
F	0.50	0.90
G	5.90	6.30
H	-	*1.80
H1	-	*9.30
I	-	*16.10
J	-	*0.80
K	-	0.96
K1	-	*0.76
M	2.20	2.40
a1	0.40	0.60
a2	2.10	2.50
y1	-	5°
y2	-	3°

\*: Typical, Unit: mm

**3-Lead TO-251  
Plastic Package  
HSMC Package Code: I**



### SOT-82 Dimension

Diagram showing top, side, and lead views of a 3-lead SOT-82 package with dimensions A through N and a1, r1, r2, r3.

**Marking:**

Pb Free Mark  
 Pb-Free: "●" (Note)  
 Normal: None

Product Series (05,06,08,09,12)

Date Code

Control Code

Note: Green label is used for pb-free packing

Pin Style: 1.Input 2.Ground 3.Output

**Material:**

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

3-Lead SOT-82  
 Plastic Package  
 HSMC Package Code: NE

DIM	Min.	Max.
A	7.57	7.67
B	5.44	5.54
C	3.78	3.98
D	10.88	10.98
E	10.25	10.75
F	-	*1.27
G	-	*0.76
H	1.16	1.26
I	-	*0.76
J	4.52	4.62
K	2.49	2.59
L	1.10	1.20
M	-	*0.60
N	1.22	1.32
a1	-	*3°
r1	-	φ3.10
r2	-	R1.70
r3	-	R0.20

\*: Typical, Unit: mm

### TO-220AB Dimension

Diagram showing top, side, and lead views of a 3-lead TO-220AB package with dimensions A through O and I, J, K, L, M, N, P.

**Marking:**

Pb Free Mark  
 Pb-Free: "●" (Note)  
 Normal: None

Product Series (05,06,08,09,12)

Date Code

Control Code

Note: Green label is used for pb-free packing

Pin Style: 1.Input 2.Ground 3.Output

**Material:**

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

3-Lead TO-220AB  
 Plastic Package  
 HSMC Package Code: E

DIM	Min.	Max.
A	5.58	7.49
B	8.38	8.90
C	4.40	4.70
D	1.15	1.39
E	0.35	0.60
F	2.03	2.92
G	9.66	10.28
H	-	*16.25
I	-	*3.83
J	3.00	4.00
K	0.75	0.95
L	2.54	3.42
M	1.14	1.40
N	-	*2.54
O	12.70	14.27
P	14.48	15.87

\*: Typical, Unit: mm

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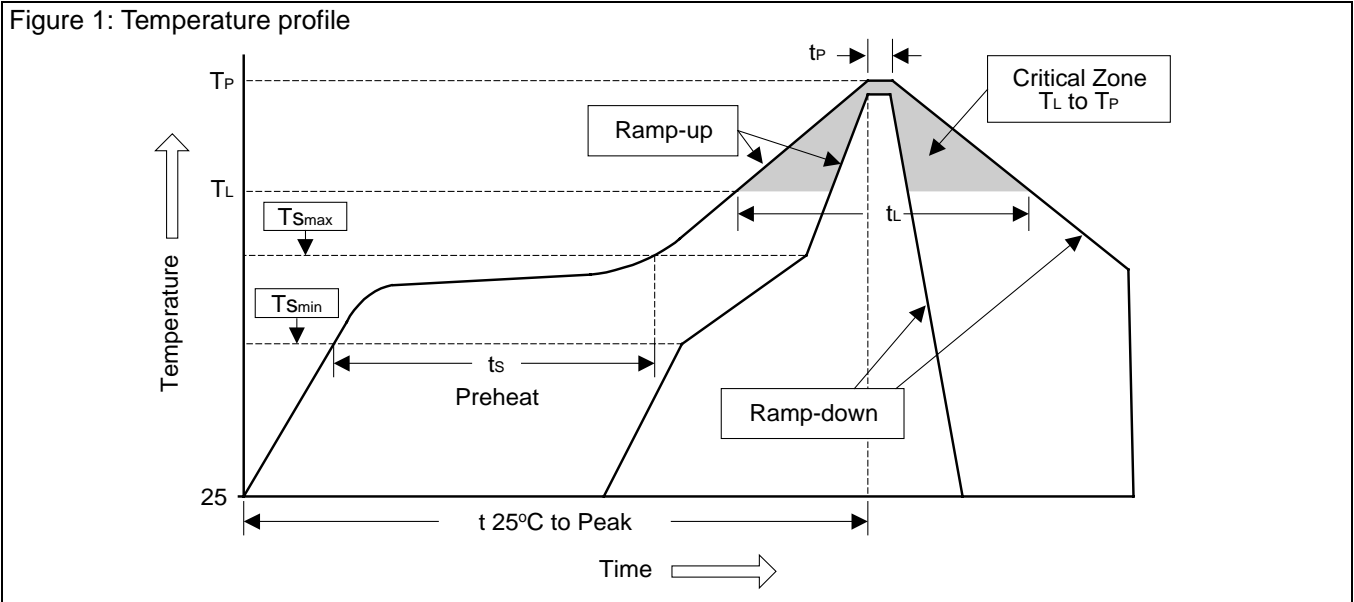
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 Tel: 886-3-5983621~5 Fax: 886-3-5982931



### Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	$<3^{\circ}\text{C}/\text{sec}$	$<3^{\circ}\text{C}/\text{sec}$
Preheat		
- Temperature Min ( $T_{Smin}$ )	100°C	150°C
- Temperature Max ( $T_{Smax}$ )	150°C	200°C
- Time (min to max) ( $t_s$ )	60~120 sec	60~180 sec
$T_{Smax}$ to $T_L$		
- Ramp-up Rate	$<3^{\circ}\text{C}/\text{sec}$	$<3^{\circ}\text{C}/\text{sec}$
Time maintained above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60~150 sec	60~150 sec
Peak Temperature ( $T_P$ )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	10~30 sec	20~40 sec
Ramp-down Rate	$<6^{\circ}\text{C}/\text{sec}$	$<6^{\circ}\text{C}/\text{sec}$
Time 25°C to Peak Temperature	$<6$ minutes	$<8$ minutes

### 3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	10sec ±1sec
Pb-Free devices.	260°C ±5°C	10sec ±1sec