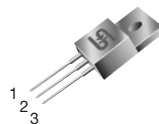
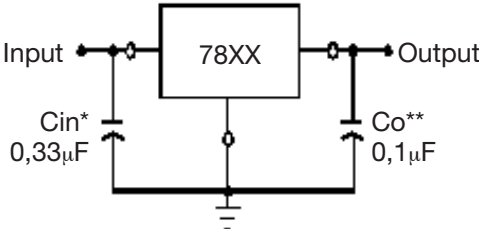
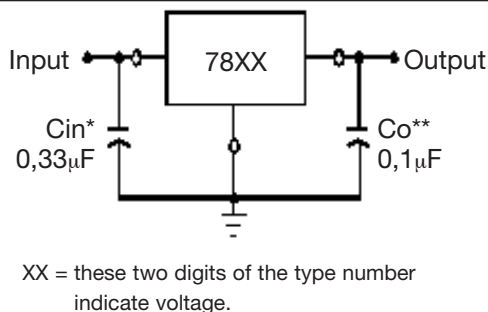


TSC 	TS7800 3-Terminal Fixed Positive Voltage Regulators																																		
TO-220 ITO-220  Pin: 1. Input 2. Ground 3. Output (Heatsink surface connected to Pin 2.)		Voltage Range 5 to 24 Volts Current 1 Ampere																																	
Features ✧ Output Current up to 1 Ampere ✧ No External Components Required ✧ Internal Thermal Overload Protection ✧ Internal Short-Circuit Current Limiting ✧ Output Transistor Safe-Area Compensation ✧ Output Voltage Offered in 4% Tolerance		Ordering Informations <table><tr><td>Device</td><td>Operating Temperature (Ambient)</td><td>Package</td></tr><tr><td>TS78xxCZ</td><td rowspan="2">-20°C to +85°C</td><td>TO-220</td></tr><tr><td>TS78xxCI</td><td>TO-220F</td></tr></table>		Device	Operating Temperature (Ambient)	Package	TS78xxCZ	-20°C to +85°C	TO-220	TS78xxCI	TO-220F																								
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TS78xxCI		TO-220F																																	
Absolute Maximum Ratings (Ta=25°C) <table><tr><td>Ratings</td><td>Symbol</td><td>TS7800 Series</td><td>Unit</td></tr><tr><td>Input Voltage</td><td>Vin *</td><td>35</td><td>V</td></tr><tr><td>Input Voltage</td><td>Vin **</td><td>40</td><td>V</td></tr><tr><td rowspan="3">Power Dissipation</td><td>TO-220</td><td>Without heatsink</td><td rowspan="3">°C/W</td></tr><tr><td>TO-220</td><td>Pt ***</td></tr><tr><td>TO-220F</td><td>With heatsink</td></tr><tr><td>Operating Ambient Temperature</td><td>Topr</td><td>-20 to +85</td><td>°C</td></tr><tr><td>Operating Junction Temperature</td><td>Tj</td><td>0 to +125</td><td>°C</td></tr><tr><td>Storage Temperature</td><td>Tstg</td><td>-25 to +150</td><td>°C</td></tr></table> Note: * TS7805 to TS7818 ** TS7824 *** Follow the derating curve				Ratings	Symbol	TS7800 Series	Unit	Input Voltage	Vin *	35	V	Input Voltage	Vin **	40	V	Power Dissipation	TO-220	Without heatsink	°C/W	TO-220	Pt ***	TO-220F	With heatsink	Operating Ambient Temperature	Topr	-20 to +85	°C	Operating Junction Temperature	Tj	0 to +125	°C	Storage Temperature	Tstg	-25 to +150	°C
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Standard Application A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the Input ripple voltage.		 XX = these two digits of the type number indicate voltage. * = Cin is required if regulator is located an appreciable distance from power supply filter. ** = Co is not needed for stability; however, it does improve transient response.																																	



* = Cin is required if regulator is located an appreciable distance from power supply filter.

** = Co is not needed for stability; however, it does improve transient response.



TS7805 Electrical Characteristics						
(Vin=10V, Iout=500mA, 0°C≤Tj≤125°C, Cin=0.33μF, Cout=0.1μF; unless otherwise specified.)						
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Vout	Tj=25°C	4.80	5	5.20	V
		7V≤Vin≤20V, 5mA≤Iout≤1.5A, PD≤15W	4.75	5	5.25	V
Line Regulation	REGline	Tj=25°C 7.5V≤Vin≤25V	--	3	100	mV
		8V≤Vin≤12V	--	1	50	mV
Load Regulation	REGload	Tj=25°C 5mA≤Iout≤1.5A	--	15	100	mV
		250mA≤Iout≤750mA	--	5	50	mV
Quiescent Current	Iq	Iout=0, Tj=25°C	--	4.2	8	mA
Quiescent Current Change	ΔIq	7V≤Vin≤25V	--	--	1.3	mA
		5mA≤Iout≤1.5A	--	--	0.5	mA
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25°C	--	40	--	μV
Ripple Rejection Ratio	RR	f=120Hz, 8V≤Vin≤18V	62	78	--	dB
Voltage Drop	Vdrop	Iout=1.0A, Tj=25°C	--	2	--	V
Output Resistance	Rout	f=1KHz	--	17	--	mΩ
Output Short Circuit Current	Ios	Tj=25°C	--	750	--	mA
Peak Output Current	I _{o peak}	Tj=25°C	--	2.2	--	A
Temperature Coefficient Output Voltage	ΔVout/ΔTj	Iout=5mA, 0°C≤Tj≤125°C	--	-0.6	--	mV/°C

TS7806 Electrical Characteristics						
(Vin=11V, Iout=500mA, 0°C≤Tj≤125°C, Cin=0.33μF, Cout=0.1μF; unless otherwise specified.)						
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Vout	Tj=25°C	5.75	6	6.25	V
		8V≤Vin≤21V, 5mA≤Iout≤1.5A, PD≤15W	6.3	6	6.3	V
Line Regulation	REGline	Tj=25°C 8V≤Vin≤25V	--	5	120	mV
		9V≤Vin≤13V	--	1.5	60	mV
Load Regulation	REGload	Tj=25°C 5mA≤Iout≤1.5A	--	14	120	mV
		250mA≤Iout≤750mA	--	4	60	mV
Quiescent Current	Iq	Iout=0, Tj=25°C	--	4.3	8	mA
Quiescent Current Change	ΔIq	8V≤Vin≤25V	--	--	1.3	mA
		5mA≤Iout≤1.5A	--	--	0.5	mA
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25°C	--	45	--	μV
Ripple Rejection Ratio	RR	f=120Hz, 9V≤Vin≤19V	59	75	--	dB
Voltage Drop	Vdrop	Iout=1.0A, Tj=25°C	--	2	--	V
Output Resistance	Rout	f=1KHz	--	19	--	mΩ
Output Short Circuit Current	Ios	Tj=25°C	--	550	--	mA
Peak Output Current	I _{o peak}	Tj=25°C	--	2.2	--	A
Temperature Coefficient of Output Voltage	ΔVout/ΔTj	Iout=5mA, 0°C≤Tj≤125°C	--	-0.7	--	mV/°C

Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

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TS7808 Electrical Characteristics

($V_{in}=14V$, $I_{out}=500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	Vout	$T_j=25^{\circ}C$		7.69	8	8.32	V
		$10.5V \leq V_{in} \leq 23V$, $5mA \leq I_{out} \leq 1.5A$, $PD \leq 15W$		7.61	8	8.40	V
Line Regulation	REGline	$T_j=25^{\circ}C$	$10.5V \leq V_{in} \leq 25V$	--	6	160	mV
			$11V \leq V_{in} \leq 17V$	--	2	80	mV
Load Regulation	REGload	$T_j=25^{\circ}C$	$10mA \leq I_{out} \leq 1.5A$	--	12	160	mV
			$250mA \leq I_{out} \leq 750mA$	--	4	80	mV
Quiescent Current	Iq	$I_{out}=0$, $T_j=25^{\circ}C$		--	4.3	8	mA
Quiescent Current Change	ΔIq	$10.5V \leq V_{in} \leq 25V$		--	--	1	mA
		$5mA \leq I_{out} \leq 1.5A$		--	--	0.5	mA
Output Noise Voltage	Vn	$10Hz \leq f \leq 100KHz$, $T_j=25^{\circ}C$		--	52	--	μV
Ripple Rejection Ratio	RR	$f=120Hz$, $11V \leq V_{in} \leq 21V$		56	72	--	dB
Voltage Drop	Vdrop	$I_{out}=1.0A$, $T_j=25^{\circ}C$		--	2	--	V
Output Resistance	Rout	$f=1KHz$		--	16	--	$m\Omega$
Output Short Circuit Current	Ios	$T_j=25^{\circ}C$		--	450	--	mA
Peak Output Current	I _{o peak}	$T_j=25^{\circ}C$		--	2.2	--	A
Temperature Coefficient of Output Voltage	$\Delta V_{out}/\Delta T_j$	$I_{out}=5mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$		--	-0.8	--	$mV/^{\circ}C$

TS7809 Electrical Characteristics

($V_{in}=15V$, $I_{out}=500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	Vout	$T_j=25^{\circ}C$		8.65	9	9.36	V
		$11.5V \leq V_{in} \leq 24V$, $5mA \leq I_{out} \leq 1.5A$, $PD \leq 15W$		8.57	9	9.45	V
Line Regulation	REGline	$T_j=25^{\circ}C$	$11.5V \leq V_{in} \leq 26V$	--	6	180	mV
			$11.5V \leq V_{in} \leq 17V$	--	2	90	mV
Load Regulation	REGload	$T_j=25^{\circ}C$	$5mA \leq I_{out} \leq 1.5A$	--	12	180	mV
			$250mA \leq I_{out} \leq 750mA$	--	4	90	mV
Quiescent Current	Iq	$I_{out}=0$, $T_j=25^{\circ}C$		--	4.3	8	mA
Quiescent Current Change	ΔIq	$11.5V \leq V_{in} \leq 26V$		--	--	1	mA
		$5mA \leq I_{out} \leq 1.5A$		--	--	0.5	mA
Output Noise Voltage	Vn	$10Hz \leq f \leq 100KHz$, $T_j=25^{\circ}C$		--	52	--	μV
Ripple Rejection Ratio	RR	$f=120Hz$, $11.5V \leq V_{in} \leq 21.5V$		55	72	--	dB
Voltage Drop	Vdrop	$I_{out}=1.0A$, $T_j=25^{\circ}C$		--	2	--	V
Output Resistance	Rout	$f=1KHz$		--	16	--	$m\Omega$
Output Short Circuit Current	Ios	$T_j=25^{\circ}C$		--	450	--	mA
Peak Output Current	I _{o peak}	$T_j=25^{\circ}C$		--	2.2	--	A
Temperature Coefficient of Output Voltage	$\Delta V_{out}/\Delta T_j$	$I_{out}=5mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$		--	-1	--	$mV/^{\circ}C$

Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

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TS7810 Electrical Characteristics							
(Vin=16V, Iout=500mA, 0°C≤Tj≤125°C, Cin=0.33μF, Cout=0.1μF; unless otherwise specified.)							
Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	Vout	Tj=25°C		9.6	10	10.4	V
		12.5V≤Vin≤25V, 5mA≤Iout≤1.5A, PD ≤15W		9.5	10	10.5	V
Line Regulation	REGline		12.5V≤Vin≤28V	--	7	200	mV
		Tj=25°C	13V≤Vin≤17V	--	2	100	mV
Load Regulation	REGload		10mA≤Iout≤1.5A	--	12	200	mV
		Tj=25°C	250mA≤Iout≤750mA	--	4	100	mV
Quiescent Current	Iq	Iout=0, Tj=25°C		--	4.3	8	mA
Quiescent Current Change	ΔIq	12.5V≤Vin≤28V		--	--	1	mA
		5mA≤Iout≤1.5A		--	--	0.5	mA
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25°C		--	70	--	μV
Ripple Rejection Ratio	RR	f=120Hz, 13V≤Vin≤23V		55	71	--	dB
Voltage Drop	Vdrop	Iout=1.0A, Tj=25°C		--	2	--	V
Output Resistance	Rout	f=1KHz		--	18	--	mΩ
Output Short Circuit Current	Ios	Tj=25°C		--	400	--	mA
Peak Output Current	Io peak	Tj=25°C		--	2.2	--	A
Temperature Coefficient of Output Voltage	ΔVout/ΔTj	Iout=5mA, 0°C≤Tj≤125°C		--	-1	--	mV/°C

TS7812 Electrical Characteristics							
(Vin=19V, Iout=500mA, 0°C≤Tj≤125°C, Cin=0.33μF, Cout=0.1μF; unless otherwise specified.)							
Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	Vout	Tj=25°C		11.53	12	12.48	V
		14.5V≤Vin≤27V, 5mA≤Iout≤1.5A, PD ≤15W		11.42	12	12.60	V
Line Regulation	REGline		14V≤Vin≤30V	--	10	240	mV
		Tj=25°C	15V≤Vin≤19V	--	3	120	mV
Load Regulation	REGload		10mA≤Iout≤1.5A	--	12	240	mV
		Tj=25°C	250mA≤Iout≤750mA	--	4	120	mV
Quiescent Current	Iq	Tj=25°C, Iout=0		--	4.3	8	mA
Quiescent Current Change	ΔIq	14.5V≤Vin≤30V		--	--	1	mA
		5mA≤Iout≤1.5A		--	--	0.5	mA
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25°C		--	75	--	μV
Ripple Rejection Ratio	RR	f=120Hz, 15V≤Vin≤25V		55	71	--	dB
Voltage Drop	Vdrop	Iout=1.0A, Tj=25°C		--	20	--	V
Output Resistance	Rout	f=1KHz		--	18	--	mΩ
Output Short Circuit Current	Ios	Tj=25°C		--	350	--	mA
Peak Output Current	Io peak	Tj=25°C		--	2.2	--	A
Temperature Coefficient of Output Voltage	ΔVout/ΔTj	Iout=5mA, 0°C≤Tj≤125°C		--	-1	--	mV/°C

Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

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TS7815 Electrical Characteristics

($V_{in}=23V$, $I_{out}=500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{out}	$T_j=25^{\circ}C$	14.42	15	15.60	V
		$17.5V \leq V_{in} \leq 30V$, $5mA \leq I_{out} \leq 1.5A$, $PD \leq 15W$	14.28	15	15.75	V
Line Regulation	REGline	$T_j=25^{\circ}C$, $17.5V \leq V_{in} \leq 30V$	--	12	300	mV
		$18V \leq V_{in} \leq 22V$	--	3	150	mV
Load Regulation	REGload	$T_j=25^{\circ}C$, $10mA \leq I_{out} \leq 1.5A$	--	12	300	mV
		$250mA \leq I_{out} \leq 750mA$	--	4	150	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$, $I_{out}=0$	--	4.3	8	mA
Quiescent Current Change	ΔI_q	$17.5V \leq V_{in} \leq 30V$	--	--	1	mA
		$5mA \leq I_{out} \leq 1.5A$	--	--	0.5	mA
Output Noise Voltage	V_n	$10Hz \leq f \leq 100KHz$, $T_j=25^{\circ}C$	--	90	--	μV
Ripple Rejection Ratio	RR	$f=120Hz$, $18V \leq V_{in} \leq 28V$	54	70	--	dB
Voltage Drop	V_{drop}	$I_{out}=1.0A$, $T_j=25^{\circ}C$	--	2	--	V
Output Resistance	R_{out}	$f=1KHz$	--	19	--	$m\Omega$
Output Short Circuit Current	I_{os}	$T_j=25^{\circ}C$	--	230	--	mA
Peak Output Current	$I_{o peak}$	$T_j=25^{\circ}C$	--	2.1	--	A
Temperature Coefficient of Output Voltage	$\Delta V_{out}/\Delta T_j$	$I_{out}=5mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$	--	-1	--	$mV/^{\circ}C$

TS7818 Electrical Characteristics

($V_{in}=27V$, $I_{out}=500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{out}	$T_j=25^{\circ}C$	17.30	18	18.72	V
		$21V \leq V_{in} \leq 33V$, $5mA \leq I_{out} \leq 1.5A$, $PD \leq 15W$	17.14	18	18.90	V
Line Regulation	REGline	$T_j=25^{\circ}C$, $21V \leq V_{in} \leq 33V$	--	15	360	mV
		$22V \leq V_{in} \leq 26V$	--	5	180	mV
Load Regulation	REGload	$T_j=25^{\circ}C$, $10mA \leq I_{out} \leq 1.5A$	--	12	360	mV
		$250mA \leq I_{out} \leq 750mA$	--	4	180	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$, $I_{out}=0$	--	4.5	8	mA
Quiescent Current Change	ΔI_q	$21V \leq V_{in} \leq 33V$	--	--	1	mA
		$5mA \leq I_{out} \leq 1.5A$	--	--	0.5	mA
Output Noise Voltage	V_n	$10Hz \leq f \leq 100KHz$, $T_j=25^{\circ}C$	--	110	--	μV
Ripple Rejection Ratio	RR	$f=120Hz$, $21V \leq V_{in} \leq 31V$	54	70	--	dB
Voltage Drop	V_{drop}	$I_{out}=1.0A$, $T_j=25^{\circ}C$	--	2	--	V
Output Resistance	R_{out}	$f=1KHz$	--	22	--	$m\Omega$
Output Short Circuit Current	I_{os}	$T_j=25^{\circ}C$	--	200	--	mA
Peak Output Current	$I_{o peak}$	$T_j=25^{\circ}C$	--	2.1	--	A
Temperature Coefficient of Output Voltage	$\Delta V_{out}/\Delta T_j$	$I_{out}=5mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$	--	-1	--	$mV/^{\circ}C$

Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

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TS7824 Electrical Characteristics

($V_{in}=33V$, $I_{out}=500mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{out}	$T_J=25^{\circ}C$	23.07	24	24.96	V
		$26V \leq V_{in} \leq 38V$, $5mA \leq I_{out} \leq 1.5A$, $PD \leq 15W$	22.85	24	25.20	V
Line Regulation	REGline	$26V \leq V_{in} \leq 38V$	--	18	480	mV
		$T_J=25^{\circ}C$, $27V \leq V_{in} \leq 32V$	--	6	240	mV
Load Regulation	REGload	$10mA \leq I_{out} \leq 1.5A$	--	12	480	mV
		$T_J=25^{\circ}C$, $250mA \leq I_{out} \leq 750mA$	--	4	240	mV
Quiescent Current	I_q	$I_{out}=0$, $T_J=25^{\circ}C$	--	4.6	8	mA
Quiescent Current Change	ΔI_q	$26V \leq V_{in} \leq 38V$	--	--	1	mA
		$5mA \leq I_{out} \leq 1.5A$	--	--	0.5	mA
Output Noise Voltage	V_n	$10Hz \leq f \leq 100KHz$, $T_J=25^{\circ}C$	--	170	--	μV
Ripple Rejection Ratio	RR	$f=120Hz$, $26V \leq V_{in} \leq 36V$	54	70	--	dB
Voltage Drop	V_{drop}	$I_{out}=1.0A$, $T_J=25^{\circ}C$	--	2	--	V
Output Resistance	R_{out}	$f=1KHz$	--	28	--	$m\Omega$
Output Short Circuit Current	I_{os}	$T_J=25^{\circ}C$	--	150	--	mA
Peak Output Current	$I_{o peak}$	$T_J=25^{\circ}C$	--	2.1	--	A
Temperature Coefficient of Output Voltage	$\Delta V_{out}/\Delta T_J$	$I_{out}=5mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$	--	-1.5	--	$mV/^{\circ}C$

Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.
This specification applies only for DC power dissipation permitted by absolute maximum ratings.

FIG. 1 - WORST CASE POWER DISSIPATION versus AMBIENT TEMPERATURE

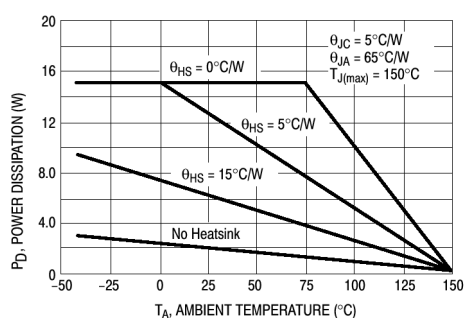
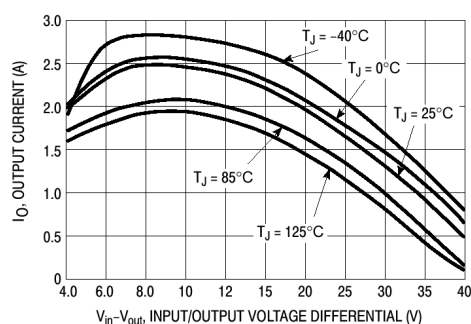


FIG. 2 - PEAK OUTPUT CURRENT AS A FUNCTION OF INPUT-OUTPUT DIFFERENTIAL VOLTAGE



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FIG. 3 - QUIESCENT CURRENT AS A FUNCTION OF TEMPERATURE

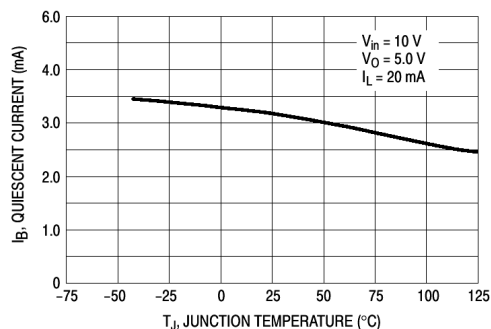


FIG. 4 - INPUT-OUTPUT DIFFERENTIAL AS A FUNCTION OF JUNCTION TEMPERATURE

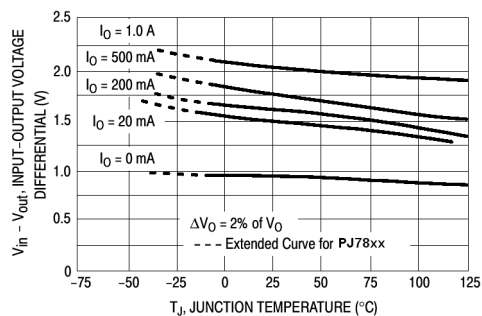


FIG. 5 - OUTPUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE

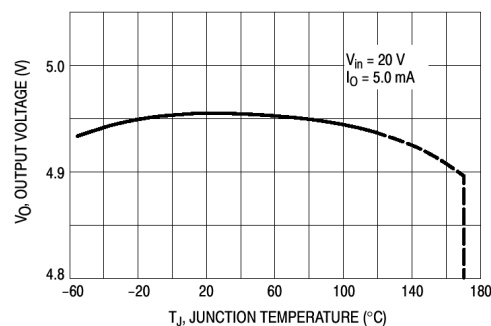


FIG. 6 - OUTPUT IMPEDANCE AS A FUNCTION OF OUTPUT VOLTAGE

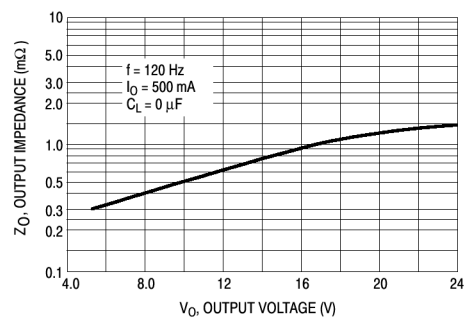


FIG. 7 - RIPPLE REJECTION AS A FUNCTION OF OUTPUT VOLTAGE

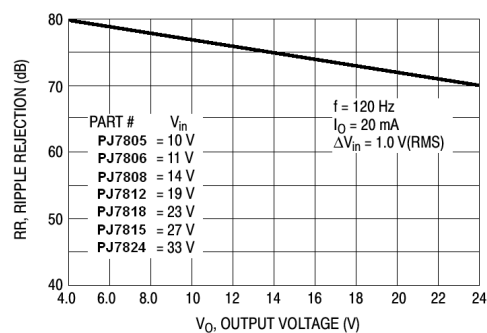
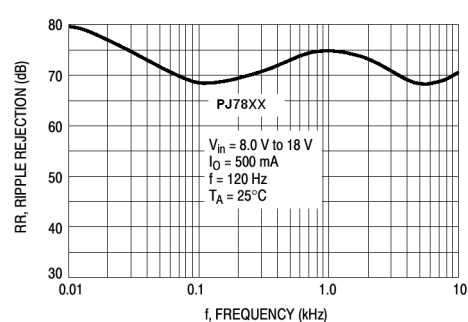


FIG. 8 - RIPPLE REJECTION AS A FUNCTION OF FREQUENCY



TO-220 Mechanical drawing		TO-220 DIMENSION			
DIM		MILLIMETERS		INCHES	
		MIN	MAX	MIN	MAX
A		10.00	10.50	0.394	0.413
B		3.24	4.44	0.128	0.175
C		2.44	2.94	0.096	0.116
D		3.565	4.315	0.140	0.170
E		0.68	0.92	0.027	0.036
F		1.115	1.485	0.044	0.058
G		2.345	2.715	0.092	0.107
H		13.49	14.31	0.531	0.563
I		4.475	5.225	0.176	0.206
J		1.15	1.39	0.045	0.055
K		27.78	29.62	1.094	1.166
L		2.175	2.925	0.086	0.115
M		0.297	0.477	0.012	0.019
N		8.28	8.80	0.326	0.346
O		14.29	15.31	0.563	0.603
P		6.01	6.51	0.237	0.256

TO-220F Mechanical drawing		TO-220F DIMENSION			
DIM		MILLIMETERS		INCHES	
		MIN	MAX	MIN	MAX
A		9.9	10.1	0.390	0.398
B		6.2	6.2	0.244	0.244
C		2.2	2.2	0.087	0.087
D		Φ1.4	Φ1.4	Φ0.055	Φ0.055
E		15.0	15.2	0.591	0.598
F		0.48	0.72	0.019	0.028
G		2.355	2.725	0.093	0.107
H		13.49	14.31	0.531	0.563
I		1.115	1.485	0.044	0.058
J		2.6	2.8	0.102	0.110
K		4.4	4.6	0.173	0.181
L		1.115	1.15	0.045	0.045
M		2.95	3.15	0.116	0.124
N		2.6	2.8	0.102	0.110
O		6.55	6.65	0.258	0.262