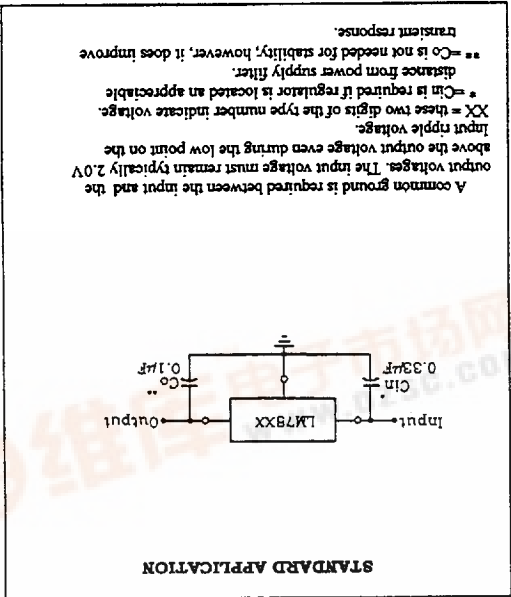
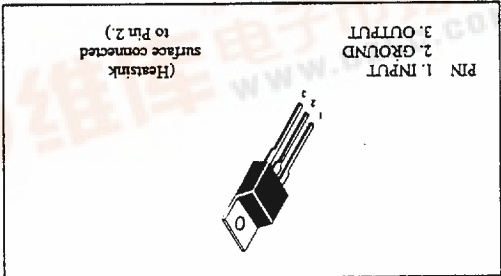




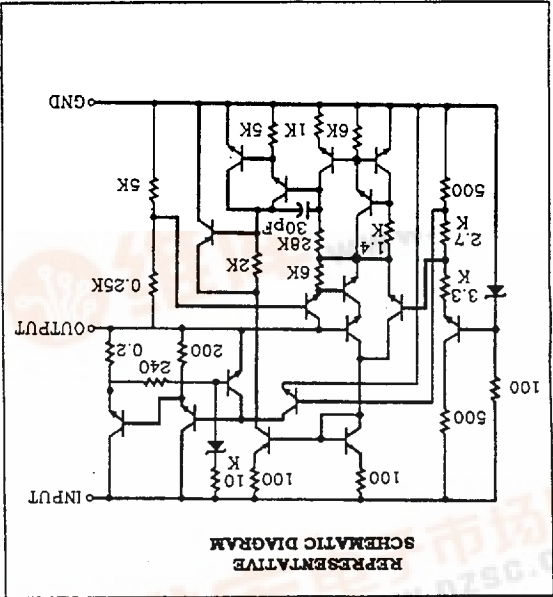
TYPICAL CONNECTING CIRCUIT



PIN ARRANGEMENT

Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents. deliver output currents in excess of 1.5 ampere. compensation. With adequate heatsinking they can

THREE-TERMINAL POSITIVE VOLTAGE REGULATORS



CIRCUIT SCHEMATIC

- Output Current in Excess of 1.5 Ampere
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Voltage Offered in 2% Tolerance

FEATURES

These voltage regulators are monolithic integrated circuits designed as fixed-voltage regulators for a wide variety of applications including local, on-card regulation. These regulators employ internal current limiting, thermal shutdown, and safe-area



LM7800 Series 3-Terminal Fixed Voltage Regulators

Item	Symbol	LM7800 Series	Unit
Input Voltage	V _{in} *	30	V
Input Voltage	V _{in} **	40	V
Power Dissipation	P _D ***	15	W
Operating Ambient Temperature	T _{OP}	-20 to +75	°C
Operating Junction Temperature	T _J	-20 to +125	°C
Storage Temperature	T _{stg}	-55 to +125	°C

LM7824 **

***Follow the detaching curve

($V_{in}=10V$, $I_{out}=500mA$, $0^\circ C \leq T_j \leq 125^\circ C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Item	Symbol	Test Conditions	min.	typ.	max.	unit
Output Voltage	Vout	Tj=25°C	4.90	5.0	5.10	V
		7V≤Vin≤20V, 5mA≤Iout≤1.0A, PDS15W	4.85	--	5.15	V
Line Regulation	REGline	Tj=25°C	--	1	50	mV
			--	15	100	mV
		Tj=25°C	--	5	50	mV
			--	5	50	mV
Load Regulation	REGload	Tj=25°C	250mA≤Iout≤750mA	--	--	--
		Tj=25°C	5mA≤Iout≤1.5A	--	--	--
Quiescent Current	Iq	Tj=25°C, Iout=0		4.2	8.0	mA
		7V≤Vin≤25V		--	1.3	mA
		5mA≤Iout≤1.0A		--	0.5	mA
		Ta=25°C, 10Hz≤f<100KHz		40	--	μV
Output Noise Voltage	Vn	f=120Hz		78	--	dB
		Iout=1.0A, Tj=25°C		2.0	--	V
Voltage Drop	Vdrop	f=1KHz		17	--	mΩ
		Tj=25°C		750	--	mA
Output Short Circuit Current	Ios	Tj=25°C		--	--	--
		Tj=25°C		2.2	--	A
Peak Output Current	Io peak	Tj=25°C		--	--	--
		Tj=25°C		--	--	--
Temperature Coefficient of Output Voltage	ΔVout/ΔTj	Iout=5mA, 0°C≤Tj≤125°C		--	-1.1	mV/°C

LM7806 ELECTRICAL CHARACTERISTICS

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

Item	Symbol	Test Conditions				unit
		min.	typ.	max.		
Output Voltage	V_{out}	$T_J=25^{\circ}C$	6.0	--	6.17	V
		$P_D \leq 15W$ $8V \leq V_{in} \leq 21V$, $5mA \leq I_{out} \leq 1.0A$	5.83	--		
Line Regulation	$\Delta V_{REGline}$	$T_J=25^{\circ}C$	--	5	120	mV
		$8V \leq V_{in} \leq 25V$ $9V \leq V_{in} \leq 13V$	--	1.5	60	mV
Load Regulation	$\Delta V_{REGload}$	$T_J=25^{\circ}C$	--	14	120	mV
		$250mA \leq I_{out} \leq 750mA$ $5mA \leq I_{out} \leq 1.5A$	--	4.0	60	mV
Quiescent Current	I_q	$T_J=25^{\circ}C$, $I_{out}=0$	--	4.3	8.0	mA
		$8V \leq V_{in} \leq 25V$ $5mA \leq I_{out} \leq 1.0A$	--	--	1.3	mA
Quiescent Current Change	ΔI_q	$T_a=25^{\circ}C$, $10Hz \leq f \leq 100KHz$	--	45	--	μV
		$5mA \leq I_{out} \leq 1.0A$	--	--	0.5	mA
Output Noise Voltage	V_n	$T_a=25^{\circ}C$, $10Hz \leq f \leq 100KHz$	--	--	--	--
		$f=120Hz$	59	75	--	dB
Voltage Drop	V_{drop}	$I_{out}=1.0A$, $T_J=25^{\circ}C$	--	2.0	--	V
		$f=1KHz$	--	19	--	mV
Output Resistance	R_{out}	$f=1KHz$	--	--	--	m Ω
		$T_J=25^{\circ}C$	--	550	--	mA
Output Short Circuit Current	I_{os}	$T_J=25^{\circ}C$	--	2.2	--	A
		$I_{out}=5mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$	--	--	--	mV/ $^{\circ}C$

LM7808 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.)

Item	Symbol	Test Conditions				unit
		min.	typ.	max.		
Output Voltage	V_{out}	$T_J=25^{\circ}C$	7.84	8.0	8.16	V
		$P_D \leq 15W$ $10.5V \leq V_{in} \leq 23V$, $5mA \leq I_{out} \leq 1.0A$	7.74	--	8.26	V
Line Regulation	$\Delta V_{REGline}$	$T_J=25^{\circ}C$	--	2.0	80	mV
		$10.5V \leq V_{in} \leq 25V$ $11V \leq V_{in} \leq 17V$	--	12	160	mV
Load Regulation	$\Delta V_{REGload}$	$T_J=25^{\circ}C$	--	4	80	mV
		$250mA \leq I_{out} \leq 750mA$ $5mA \leq I_{out} \leq 1.5A$	--	4.3	8.0	mA
Quiescent Current	I_q	$T_J=25^{\circ}C$, $I_{out}=0$	--	4.3	8.0	mA
		$10.5V \leq V_{in} \leq 25V$ $5mA \leq I_{out} \leq 1.0A$	--	--	1.0	mA
Quiescent Current Change	ΔI_q	$T_a=25^{\circ}C$, $10Hz \leq f \leq 100KHz$	--	52	--	μV
		$5mA \leq I_{out} \leq 1.0A$	--	--	0.5	mA
Output Noise Voltage	V_n	$T_a=25^{\circ}C$, $10Hz \leq f \leq 100KHz$	--	52	--	μV
		$f=120Hz$	56	72	--	dB
Voltage Drop	V_{drop}	$I_{out}=1.0A$, $T_J=25^{\circ}C$	--	2.0	--	V
		$f=1KHz$	--	16	--	m Ω
Output Short Circuit Current	I_{os}	$T_J=25^{\circ}C$	--	450	--	mA
		$I_{out}=5mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$	--	2.2	--	A
Temperature Coefficient of Output Voltage	$\Delta V_{out}/\Delta T_J$	$T_J=25^{\circ}C$	--	--	--	mV/ $^{\circ}C$

• LM7809 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.)

Item	Symbol	Test Conditions				min.	typ.	max.	unit
Output Voltage	V _{out}	T _J =25℃				8.82	9	9.18	V
		P _{DS} ≤15W 10.5V≤V _{IN} ≤27V, 5mA≤I _{OUT} ≤1.0A,				8.77	--	9.23	V
Line Regulation	Δ REG _{line}	T _J =25℃	11.5V≤V _{IN} ≤30V		--	6	160	mV	
			12V≤V _{IN} ≤18V		--	2.0	80	mV	
		T _J =25℃	5mA≤I _{OUT} ≤1.5A		--	12	160	mV	
			250mA≤I _{OUT} ≤750mA		--	4	80	mV	
Load Regulation	Δ REG _{load}	T _J =25℃			--				
Quiescent Current	I _q	T _J =25℃, I _{OUT} =0		--	4.3	1.0	0.5	mA	
Quiescent Current Change	Δ I _q	14.5V≤V _{IN} ≤30V		--	--	--	--	mA	
		5mA≤I _{OUT} ≤1.0A		--	--	--	--	mA	
Output Noise Voltage	V _n	T _a =25℃, 10Hz≤f≤100KHz		--	52	--	--	μV	
Ripple Rejection Ratio	RR	f=120Hz		55	72	--	--	dB	
Voltage Drop	V _{drop}	I _{OUT} =1.0A, T _J =25℃		--	2.0	--	--	V	
Output Resistance	R _{OUT}	f=1KHz		--	16	--	--	mΩ	
Output Short Circuit Current	I _{OS}	T _J =25℃		--	450	--	--	mA	
Peak Output Current	I _{o peak}	T _J =25℃		--	2.2	--	--	A	
Temperature Coefficient of Output Voltage	Δ V _{OUT} /Δ T _J	I _{OUT} =5mA, 0℃≤T _J ≤125℃		--	-1.8	--	--	mV/℃	

• LM7810 ELECTRICAL CHARACTERISTICS

$V_{in}=16V$, $I_{out}=500mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_{in}=0.33\mu F$, $C_{out}=0.1\mu F$; unless otherwise specified.)

Item	Symbol	Test Conditions				min.	typ.	max.	unit
Output Voltage	V _{out}	T _J =25℃				9.8	10	10.2	V
		P _o ≤15W 17.5V≤V _{in} ≤30V, 5mA≤I _{out} ≤1.0A,				9.75	-	12.25	V
Line Regulation	Δ REG _{line}	T _J =25℃	10.5V≤V _{in} ≤30V		-	10	240	mV	
			13V≤V _{in} ≤9V		-	3.0	120	mV	
		T _J =25℃	5mA≤I _{out} ≤1.5A		-	12	240	mV	
			250mA≤I _{out} ≤750mA		-	4.0	120	mV	
Load Regulation	Δ REG _{load}	T _J =25℃			-	-	-	-	
Quiescent Current	I _q	T _J =25℃, I _{out} =0			-	-	-	-	
Quiescent Current Change	Δ I _q	14.5V≤V _{in} ≤30V		-	-	-	-	-	
		5mA≤I _{out} ≤1.0A		-	-	-	-	-	
Output Noise Voltage	V _n	T _a =25℃, 10Hz≤f≤100KHz		-	52	-	-	μ V	
Ripple Rejection Ratio	RR	f=120Hz		54	72	-	-	dB	
Voltage Drop	V _{drop}	I _{out} =1.0A, T _J =25℃		-	2.0	-	-	V	
Output Resistance	R _{out}	f=1KHz		-	16	-	-	mΩ	
Output Short Circuit Current	I _{os}	T _J =25℃		-	450	-	-	mA	
Peak Output Current	I _{o peak}	T _J =25℃		-	2.2	-	-	A	
Temperature Coefficient of Output Voltage	Δ V _{out} / Δ T _J	I _{out} =5mA, 0℃≤T _J ≤125℃		-	-	-	-	mV/℃	

• LM7812 ELECTRICAL CHARACTERISTICS

(V_{in}=19V, I_{out}=500mA, 0°C ≤ T_j ≤ 125°C, C_{in}=0.33µF, C_{out}=0.1µF; unless otherwise specified.)

Item	Symbol	Test Conditions				unit
Output Voltage	Vout	Tj=25℃	11.76	12.0	12.24	V
		14.5V≤Vin≤27V, 5mA≤Iout≤1.0A, PDS15W				
Line Regulation	Δ REGline	Tj=25℃	--	10	240	mV
			14.5V≤Vin≤30V	--	3.0	120
		Tj=25℃	--	12	240	mV
			5mA≤Iout≤1.5A	--	4.0	120
Load Regulation	Δ REGload	Tj=25℃	--	4.0	120	mV
		250mA≤Iout≤750mA	--	4.3	8.0	mA
Quiescent Current	Iq	Tj=25℃, Iout=0	--	--	--	mA
Quiescent Current Change	Δ Iq	14.5V≤Vin≤30V				mA
		5mA≤Iout≤1.0A				0.5 mA
Output Noise Voltage	Vn	Ta=25℃, 10Hz<f≤100KHz	--	75	--	μ V
Ripple Rejection Ratio	RR	f=120Hz	55	--	--	dB
Voltage Drop	Vdrop	Iout=1.0A, Tj=25℃	--	2.0	--	V
Output Resistance	Rout	f=1KHz	--	18	--	mΩ
Output Short Circuit Current	Ios	Tj=25℃	--	350	--	mA
Peak Output Current	Iopk	Tj=25℃	--	2.2	--	A
Temperature Coefficient of Output Voltage	Δ Vout/ Δ Tj	Iout=5mA, 0℃ ≤Tj≤125℃	--	-1.0	--	mV/℃

• LM7815 ELECTRICAL CHARACTERISTICS

(V_{in}=23V, I_{out}=500mA, 0°C ≤ T_j ≤ 125°C, C_{in}=0.33µF, C_{out}=0.1µF; unless otherwise specified.)

Item	Symbol	Test Conditions				unit
Output Voltage	Vout	Tj=25℃	14.7	15.0	15.3	V
		17.5V≤Vin≤30V, 5mA≤Iout≤1.0A, PDS15W				
Line Regulation	Δ REGline	Tj=25℃	17.5V≤Vin≤30V	--	11	300 mV
			20V≤Vin≤26V	--	3.0	150 mV
			5mA≤Iout≤1.5A	--	12	300 mV
Load Regulation	Δ REGload	Tj=25℃	250mA≤Iout≤750mA	--	4	150 mV
			5mA≤Iout≤1.0A	--	8.0	150 mV
Quiescent Current	Iq	Tj=25℃, Iout=0	--	4.4	8.0	mA
Quiescent Current Change	Δ Iq	Ta=25℃, 10Hz≤f≤100KHz	--	--	0.5	mA
			5mA≤Iout≤1.0A	--	90	μV
Output Noise Voltage	Vn	Ta=25℃, 10Hz≤f≤100KHz	--	54	70	dB
Voltage Drop	Vdrop	Iout=1.0A, Tj=25℃	--	2.0	--	V
Output Resistance	Rout	f=1KHz	--	19	--	mΩ
Output Short Circuit Current	Ios	Tj=25℃	--	230	--	mA
Peak Output Current	Iopk	Tj=25℃	--	2.1	--	A
Temperature Coefficient of Output Voltage	Δ Vout/Δ Tj	Iout=5mA, 0℃≤Tj≤125℃	--	-1.0	--	mV/℃

• LM7818 ELECTRICAL CHARACTERISTICS

(V_{in}=27V, I_{out}=500mA, 0°C ≤ T_j ≤ 125°C, C_{in}=0.33µF, C_{out}=0.1µF; unless otherwise specified.)

Item	Symbol	Test Conditions				unit
		min.	typ.	max.		
Output Voltage	V _{out}	17.64	18.0	18.56	T _j =25°C	V
					21.0V ≤ V _{in} ≤ 33V, 5mA ≤ I _{out} ≤ 1.0A, P _o ≤ 15W	V
Line Regulation	Δ V _o line	--	5.0	180	T _j =25°C	mV
					24V ≤ V _{in} ≤ 30V	mV
Load Regulation	Δ REG _{load}	--	12	360	T _j =25°C	mV
					5mA ≤ I _{out} ≤ 1.5A	mV
Quiescent Current	I _q	--	4.5	8.0	T _j =25°C, I _{out} =0	mA
					250mA ≤ I _{out} ≤ 750mA	mA
Quiescent Current Change	Δ I _q	--	--	1.0	21.0V ≤ V _{in} ≤ 33V	mA
					5mA ≤ I _{out} ≤ 1.0A	mA
Output Noise Voltage	V _n	--	110	--	T _a =25°C, 10Hz ≤ f ≤ 100KHz	µV
					f=120Hz	dB
Ripple Rejection Ratio	RR	53	69	--	f=120Hz	
					I _{out} =1.0A, T _j =25°C	V
Voltage Drop	V _{drop}	--	2.0	--	I _{out} =1.0A, T _j =25°C	V
					f=1KHz	mΩ
Output Resistance	R _{out}	--	22	--	f=1KHz	
					T _j =25°C	mA
Output Short Circuit Current	I _{os}	--	200	--	T _j =25°C	A
					T _j =25°C	mV/°C
Peak Output Current	I _{o peak}	--	2.1	--	T _j =25°C	
					I _{out} =5mA, 0°C ≤ T _j ≤ 125°C	

• LM7824 ELECTRICAL CHARACTERISTICS

(V_{in}=33V, I_{out}=500mA, 0°C ≤ T_j ≤ 125°C, C_{in}=0.33µF, C_{out}=0.1µF; unless otherwise specified.)

Item	Symbol	Test Conditions				unit
		min.	typ.	max.		
Output Voltage	V _{out}	23.32	24.0	24.48	T _j =25°C	V
					27.0V ≤ V _{in} ≤ 38V, 5mA ≤ I _{out} ≤ 1.0A, P _o ≤ 15W	V
Line Regulation	Δ V _o line	--	6.0	480	T _j =25°C	mV
					30V ≤ V _{in} ≤ 36V	mV
Load Regulation	Δ V _o load	--	4.0	240	T _j =25°C	mV
					5mA ≤ I _{out} ≤ 1.5A	mV
Quiescent Current	I _q	--	4.6	8.0	T _j =25°C, I _{out} =0	mA
					27.0V ≤ V _{in} ≤ 38V	mA
Quiescent Current Change	Δ I _q	--	--	0.5	5mA ≤ I _{out} ≤ 1.0A	mA
					T _a =25°C, 10Hz ≤ f ≤ 100KHz	µV
Output Noise Voltage	V _n	--	170	--	T _a =25°C, 10Hz ≤ f ≤ 100KHz	dB
					f=120Hz	
Ripple Rejection Ratio	RR	50	66	--	f=120Hz	
					I _{out} =1.0A, T _j =25°C	V
Voltage Drop	V _{drop}	--	2.0	--	I _{out} =1.0A, T _j =25°C	V
					f=1KHz	mΩ
Output Resistance	R _{out}	--	28	--	f=1KHz	
					T _j =25°C	mA
Output Short Circuit Current	I _{os}	--	150	--	T _j =25°C	A
					T _j =25°C	mV/°C
Peak Output Current	I _{o peak}	--	2.1	--	T _j =25°C	
					I _{out} =5mA, 0°C ≤ T _j ≤ 125°C	

FIGURE 1 - WORST CASE POWER DISSIPATION
versus AMBIENT TEMPERATURE (Case 221A)

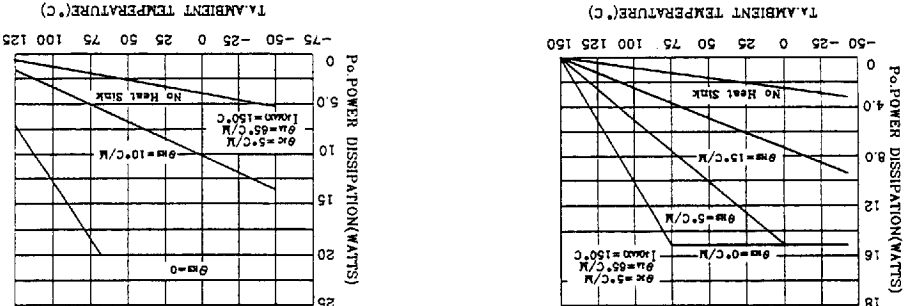


FIGURE 2 - WORST CASE POWER DISSIPATION
versus AMBIENT TEMPERATURE (Case 1)

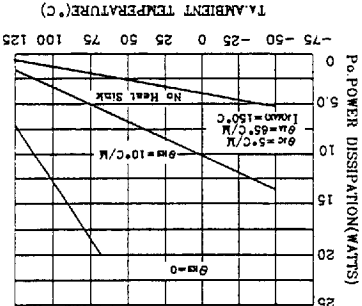


FIGURE 3 - INPUT OUTPUT DIFFERENTIAL AS A
FUNCTION OF JUNCTION TEMPERATURE

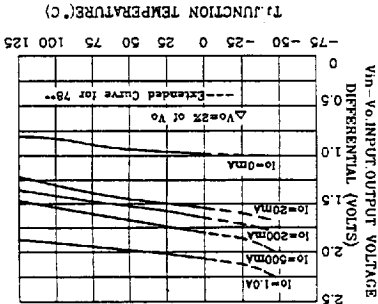


FIGURE 4 - INPUT OUTPUT DIFFERENTIAL AS A
FUNCTION OF JUNCTION TEMPERATURE

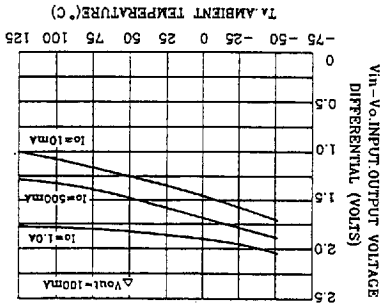


FIGURE 5 - PEAK OUTPUT CURRENT AS A
FUNCTION OF INPUT-OUTPUT DIFFERENTIAL

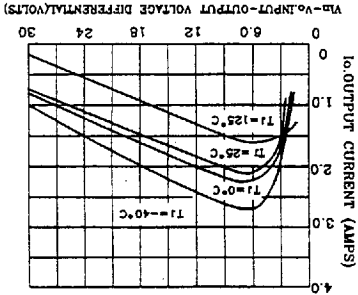


FIGURE 6 - PEAK OUTPUT CURRENT AS A
FUNCTION OF INPUT-OUTPUT DIFFERENTIAL

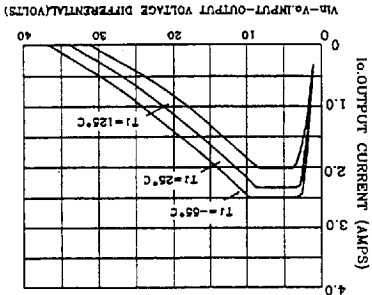




FIGURE 7 - RIPPLE REJECTION AS A FUNCTION OF OUTPUT VOLTAGE

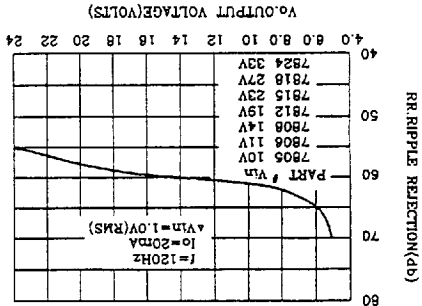


FIGURE 8 - RIPPLE REJECTION AS A FUNCTION OF FREQUENCY

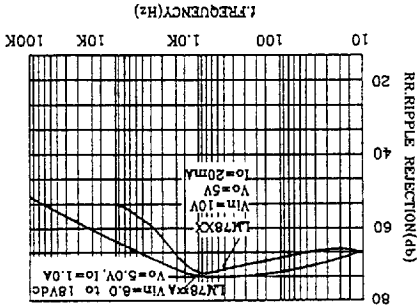


FIGURE 9 - OUTPUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE

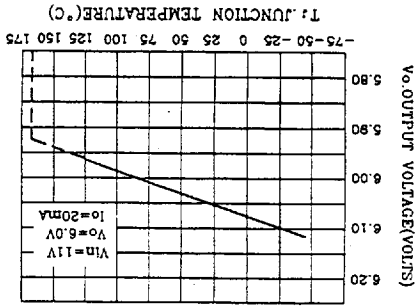


FIGURE 10 - OUTPUT IMPEDANCE AS A FUNCTION OF OUTPUT VOLTAGE

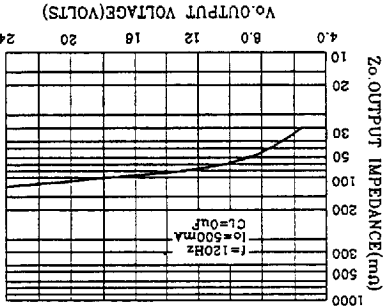


FIGURE 11 - QUIESCENT CURRENT AS A FUNCTION OF TEMPERATURE

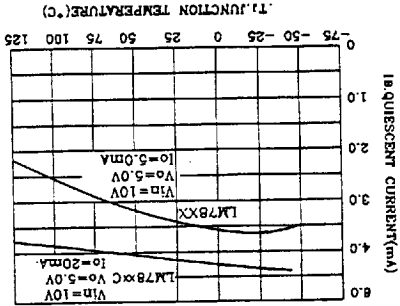


FIGURE 12 - DROPOUT CHARACTERISTICS

