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http//www.datasheet4u

Lampiran 1

DAFTAR KOMPONEN

Resistor

R1	=	1,5 KΩ
R2, R3, R53	=	22 KΩ
R4, R5, R32, R33	=	1 KΩ
R6, R7, R61, R62, R74	=	20 KΩ
R8, R9	=	1 Ω
R10, R11, R12, R13, R19, R34, R35	=	47 KΩ
R14, R17, R20-R25, R47-R49, R55, R56	=	100 KΩ
R18, R57	=	330 KΩ
R26-R31, R66, R70	=	150 Ω
R36-R43, R67	=	8,06 KΩ
R44-R46	=	16 KΩ
R50, R51	=	5,6 KΩ
R52	=	2,4 KΩ
R53	=	8,2 KΩ
R58-R60, R63-R65, R71-R73	=	10 KΩ
R68	=	9,53 KΩ
R69	=	102 KΩ

Lampiran 2

Potensiometer

R75, RR80	=	100 KΩ
R76	=	10 KΩ
R77	=	50 KΩ
R78, R79	=	1 KΩ

Semikonduktor

D1 – D2	=	!N5400 (3A)
IC1 – IC4	=	TL 084
IC5	=	MN 3008
IC6	=	MN 3101
IC7	=	LM 7812
IC8	=	MC 7912
IC9,IC10	=	LM 1875
LED1		

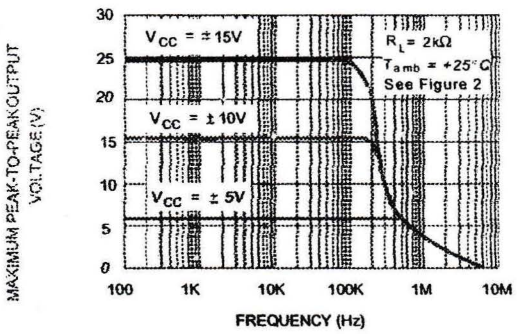
ELECTRICAL CHARACTERISTICS

V_{CC} = ±15V, T_{amb} = 25°C (unless otherwise specified)

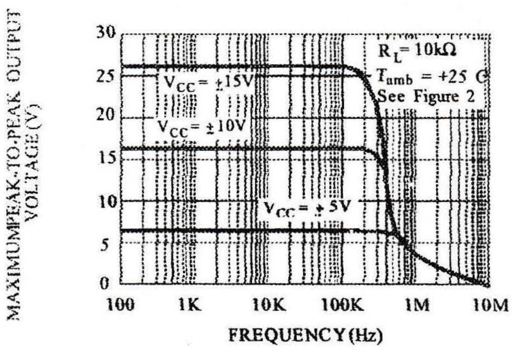
Symbol	Parameter	TL084I,M,AC,AI, AM,BC,BI,BM			TL084C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	*Input Offset Voltage* (R_S = 50Ω) T_{amb} = 25°C TL084 TL084A TL084B $T_{min.} \leq T_{amb} \leq T_{max.}$ TL084 TL084A TL084B		 3 3 1	 10 6 3 13 7 5		 3	 10 13	mV
DV_{io}	Input Offset Voltage Drift		10			10		µV/°C
I_{io}	Input Offset Current * T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		 5	 100 4		 5	 100 4	 pA nA
I_{ib}	Input Bias Current * T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		 20	 200 20		 30	 400 20	 pA nA
A_{vd}	Large Signal Voltage Gain (R_L = 2kΩ, V_O = ±10V) T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	 50 25	 200		 25 15	 200		V/mV
SVR	Supply Voltage Rejection Ratio (R_S = 50Ω) T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	 80 80	 86		 70 70	 86		dB
I_{CC}	*Supply Current, per Amp, no Load* T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		 1.4	 2.5 2.5		 1.4	 2.5 2.5	mA
V_{icm}	Input Common Mode Voltage Range	±11	+15 -12		±11	+15 -12		V
CMR	Common Mode Rejection Ratio (R_S = 50Ω) T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	 80 80	 86		 70 70	 86		dB
Ios	Output Short-circuit Current T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	 10 10	 40	 60 60	 10 10	 40	 60 60	mA
$\pm V_{OPP}$	*Output Voltage Swing* T_{amb} = 25°C R_L = 2kΩ R_L = 10kΩ $T_{min.} \leq T_{amb} \leq T_{max.}$ R_L = 2kΩ R_L = 10kΩ	 10 12 10 12	 12 13.5		 10 12 10 12	 12 13.5		V
SR	Slew Rate (V_{in} = 10V, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, *unity gain*)	8	16		8	16		V/µs
t_r	Rise Time (V_{in} = 20mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain)		0.1			0.1		µs
K_{OV}	Overshoot (V_{in} = 20mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, *unity gain*)		10			10		%
GBP	*Gain Bandwidth Product* (f = 100kHz, T_{amb} = 25°C, V_{in} = 10mV, R_L = 2kΩ, C_L = 100pF)	2.5	4		2.5	4		MHz
R_i	Input Resistance		10^{12}			10^{12}		Ω
THD	Total Harmonic Distortion (f = 1kHz, A_V = 20dB, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, V_O = 2V_{PP})		0.01			0.01		%
e_n	*Equivalent Input Noise Voltage* (f = 1kHz, R_s = 100Ω)		15			15		$\frac{nV}{\sqrt{Hz}}$
∅m	Phase Margin		45			45		Degrees
V_{O1}/V_{O2}	Channel Separation (A_v = 100)		120			120		dB

* The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature.

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



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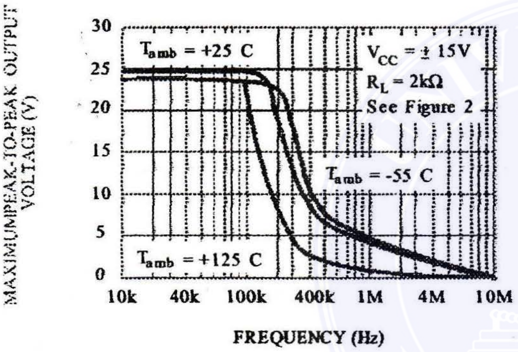
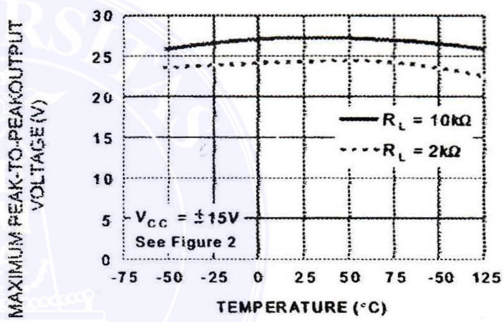
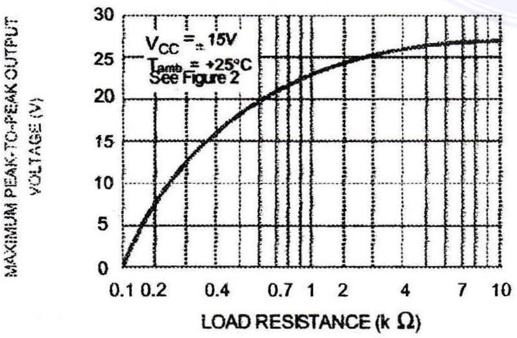


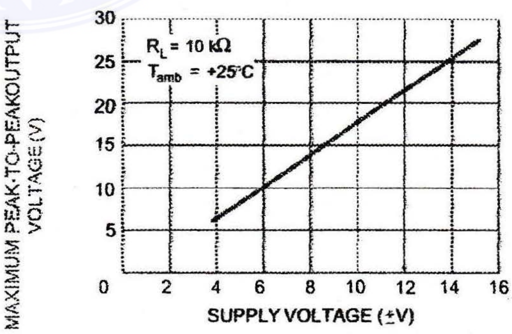
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREE AIR TEMP.



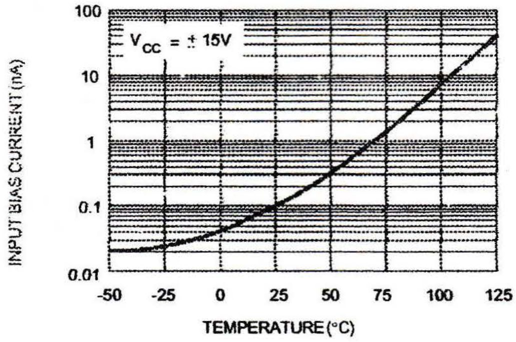
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE



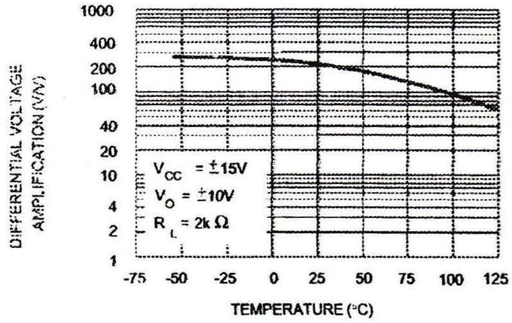
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE



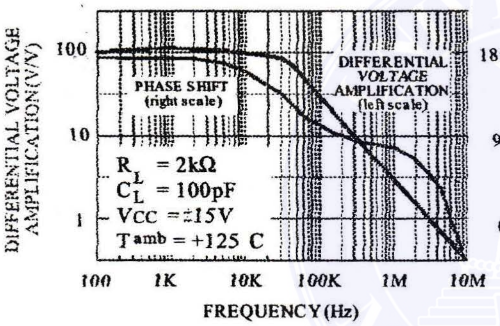
INPUT BIAS CURRENT VERSUS FREE AIR TEMPERATURE



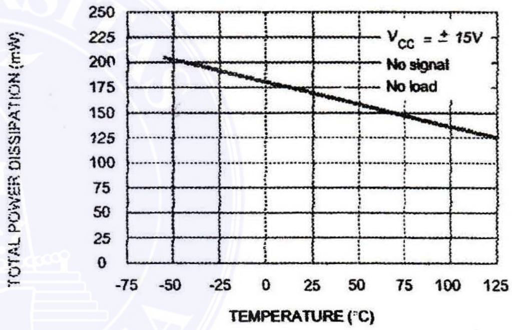
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE AIR TEMPERATURE



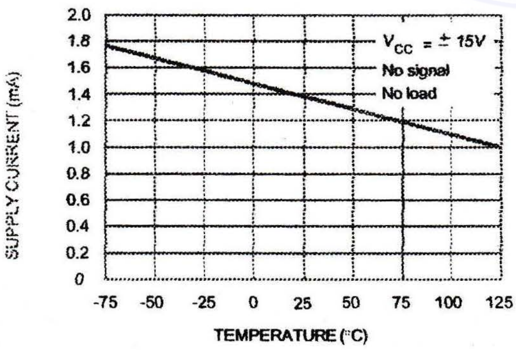
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



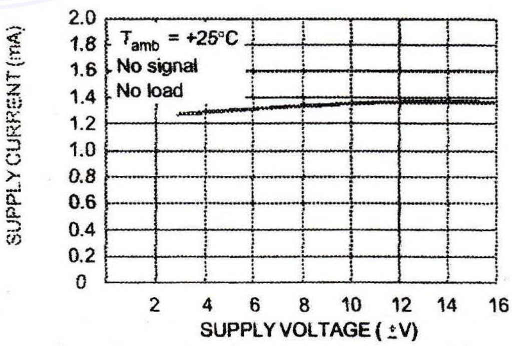
TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



SUPPLY CURRENT PER AMPLIFIER VERSUS FREE AIR TEMPERATURE



SUPPLY CURRENT PER AMPLIFIER VERSUS SUPPLY VOLTAGE



Absolute Maximum Ratings (Note 1)

Supply Voltage	60V
Input Voltage	$-V_{EE}$ to V_{CC}
Storage Temperature	−65˚C to + 150˚C
Junction Temperature	150˚C
Lead Temperature (Soldering, 10 seconds)	260˚C
θ_{JC}	3˚C
θ_{JA}	73˚C

Electrical Characteristics

V_{CC}=+25V, $-V_{EE}$=−25V, $T_{AMBIENT}$=25˚C, R_L=8Ω, A_V=20 (26 dB), f_o=1 kHz, unless otherwise specified.

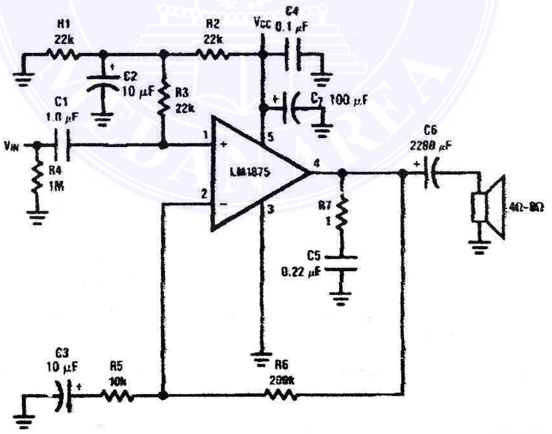
Parameter	Conditions	Typical	Tested Limits	Units
Supply Current	P_{OUT}=0W	70	100	mA
Output Power (Note 2)	THD=1%	25		W
THD (Note 2)	P_{OUT}=20W, f_o=1 kHz	0.015		%
	P_{OUT}=20W, f_o=20 kHz	0.05	0.4	%
	P_{OUT}=20W, R_L=4Ω, f_o=1 kHz	0.022		%
	P_{OUT}=20W, R_L=4Ω, f_o=20 kHz	0.07	0.6	%
Offset Voltage		±1	±15	mV
Input Bias Current		±0.2	±2	µA
Input Offset Current		0	±0.5	µA
Gain-Bandwidth Product	f_o=20 kHz	5.5		MHz
Open Loop Gain	DC	90		dB
PSRR	V_{CC}, 1 kHz, 1 Vrms	95	52	dB
	V_{EE}, 1 kHz, 1 Vrms	83	52	dB
Max Slew Rate	20W, 8Ω, 70 kHz BW	8		V/µs
Current Limit	V_{OUT} = V_{SUPPLY} −10V	4	3	A
Equivalent Input Noise Voltage	R_S=600Ω, CCIR	3		µVrms

Note 1: "Absolute Maximum Ratings" indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

Note 2: Assumes the use of a heat sink having a thermal resistance of 1˚C/W and no insulator with an ambient temperature of 25˚C. Because the output limiting circuitry has a negative temperature coefficient, the maximum output power delivered to a 4Ω load may be slightly reduced when the tab temperature exceeds 55˚C.

Typical Applications

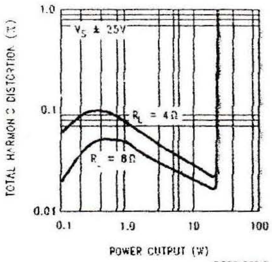
Typical Single Supply Operation



DS005030-3

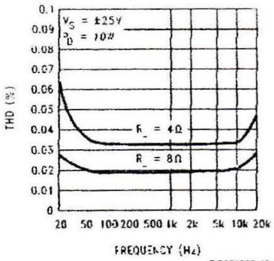
Typical Performance Characteristics

THD vs Power Output



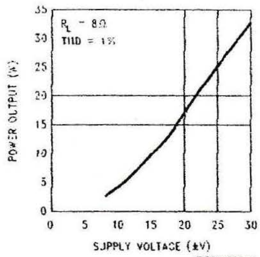
DS005030-9

THD vs Frequency



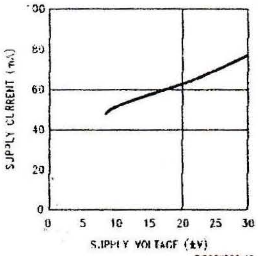
DS005030-10

Power Output vs Supply Voltage



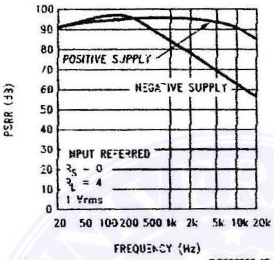
DS005030-11

Supply Current vs Supply Voltage



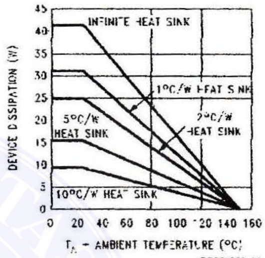
DS005030-12

PSRR vs Frequency



DS005030-13

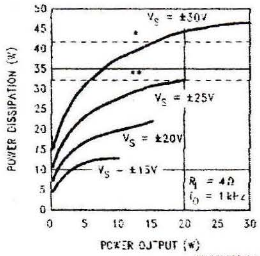
Device Dissipation vs Ambient Temperature†



DS005030-14

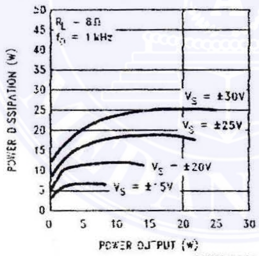
†φINTERFACE = 1°C/W.
See Application Hints.

Power Dissipation vs Power Output



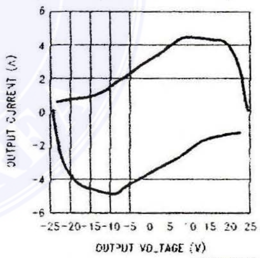
DS005030-15

Power Dissipation vs Power Output



DS005030-16

I_{OUT} vs V_{OUT}-Current Limit/ Safe Operating Area Boundary



DS005030-17

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Input Voltage (V_O = 5V, 12V and 15V)	35V
Internal Power Dissipation (Note 1)	Internally Limited
Operating Temperature Range (T_A)	0°C to +70°C
Maximum Junction Temperature	
(K Package)	150°C
(T Package)	150°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	
TO-3 Package K	300°C
TO-220 Package T	230°C

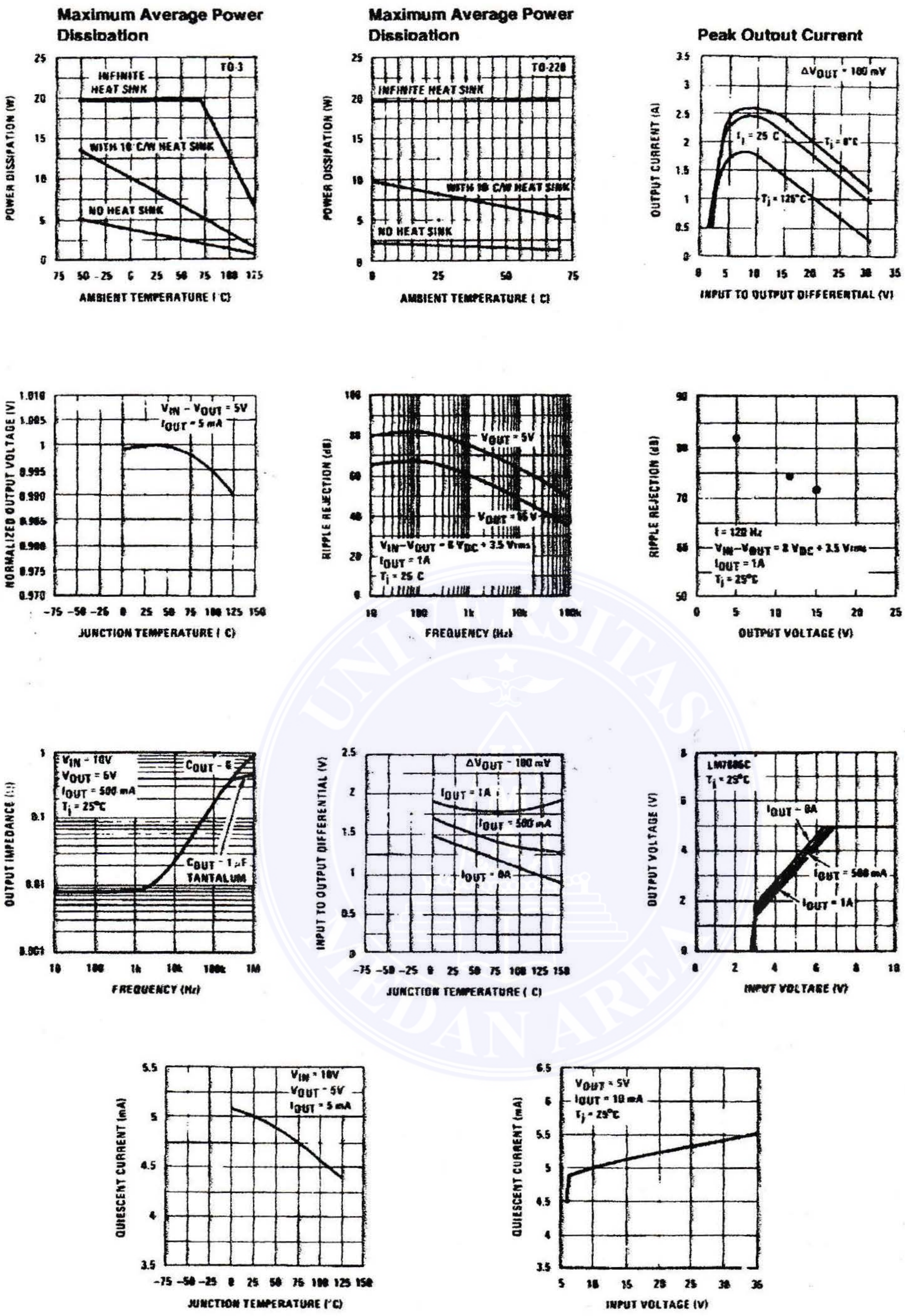
Electrical Characteristics LM78XXC (Note 2) 0°C ≤ Tj ≤ 125°C unless otherwise noted.

Output Voltage			5V			12V			15V			Units
Input Voltage (unless otherwise noted)			10V			19V			23V			
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	
V_O	Output Voltage	Tj = 25°C, 5 mA ≤ I_O ≤ 1A	4.8	5	5.2	11.5	12	12.5	14.4	15	15.6	V
		P_D ≤ 15W, 5 mA ≤ I_O ≤ 1A	4.75		5.25	11.4		12.6	14.25		15.75	V
		V_{MIN} ≤ V_{IN} ≤ V_{MAX}		(7.5 ≤ V_{IN} ≤ 20)			(14.5 ≤ V_{IN} ≤ 27)			(17.5 ≤ V_{IN} ≤ 30)		V
ΔV_O	Line Regulation	I_O = 500 mA, Tj = 25°C		3	50		4	120		4	150	mV
		ΔV_{IN}		(7 ≤ V_{IN} ≤ 25)			14.5 ≤ V_{IN} ≤ 30)			(17.5 ≤ V_{IN} ≤ 30)		V
		I_O = 500 mA, 0°C ≤ Tj ≤ +125°C			50			120			150	mV
		ΔV_{IN}		(8 ≤ V_{IN} ≤ 20)			(15 ≤ V_{IN} ≤ 27)			(18.5 ≤ V_{IN} ≤ 30)		V
		I_O ≤ 1A, Tj = 25°C			50			120			150	mV
		ΔV_{IN}		(7.5 ≤ V_{IN} ≤ 20)			(14.6 ≤ V_{IN} ≤ 27)			(17.7 ≤ V_{IN} ≤ 30)		V
		I_O ≤ 1A, 0°C ≤ Tj ≤ +125°C			25			60			75	mV
		ΔV_{IN}		(8 ≤ V_{IN} ≤ 12)			(16 ≤ V_{IN} ≤ 22)			(20 ≤ V_{IN} ≤ 26)		V
ΔV_O	Load Regulation	Tj = 25°C, 5 mA ≤ I_O ≤ 1.5A		10	50		12	120		12	150	mV
		Tj = 25°C, 250 mA ≤ I_O ≤ 750 mA			25			60			75	mV
		5 mA ≤ I_O ≤ 1A, 0°C ≤ Tj ≤ +125°C			50			120			150	mV
I_Q	Quiescent Current	I_O ≤ 1A, Tj = 25°C			8			8			8	mA
		I_O ≤ 1A, 0°C ≤ Tj ≤ +125°C			8.5			8.5			8.5	mA
ΔI_Q	Quiescent Current Change	5 mA ≤ I_O ≤ 1A			0.5			0.5			0.5	mA
		Tj = 25°C, I_O ≤ 1A			1.0			1.0			1.0	mA
		V_{MIN} ≤ V_{IN} ≤ V_{MAX}		(7.5 ≤ V_{IN} ≤ 20)			(14.8 ≤ V_{IN} ≤ 27)			(17.9 ≤ V_{IN} ≤ 30)		V
		I_O ≤ 500 mA, 0°C ≤ Tj ≤ +125°C			1.0			1.0			1.0	mA
		V_{MIN} ≤ V_{IN} ≤ V_{MAX}		(7 ≤ V_{IN} ≤ 25)			(14.5 ≤ V_{IN} ≤ 30)			(17.5 ≤ V_{IN} ≤ 30)		V
V_N	Output Noise Voltage	T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz		40			75			90		μV
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	f = 120 Hz, I_O ≤ 1A, Tj = 25°C or	62	80		55	72		54	70		dB
		f = 120 Hz, I_O ≤ 500 mA, 0°C ≤ Tj ≤ +125°C	62			55			54			dB
		V_{MIN} ≤ V_{IN} ≤ V_{MAX}		(8 ≤ V_{IN} ≤ 18)			(15 ≤ V_{IN} ≤ 25)			(18.5 ≤ V_{IN} ≤ 28.5)		V
R_O	Dropout Voltage	Tj = 25°C, I_{OUT} = 1A		2.0			2.0			2.0		V
	Output Resistance	f = 1 kHz		8			18			19		mΩ
	Short-Circuit Current	Tj = 25°C		2.1			1.5			1.2		A
	Peak Output Current	Tj = 25°C		2.4			2.4			2.4		A
	Average TC of V_{OUT}	0°C ≤ Tj ≤ +125°C, I_O = 5 mA		0.6			1.5			1.8		mV/°C
V_{IN}	Input Voltage Required to Maintain Line Regulation	Tj = 25°C, I_O ≤ 1A		7.5		14.6			17.7			V

Note 1: Thermal resistance of the TO-3 package (K, KC) is typically 4°C/W junction to case and 35°C/W case to ambient. Thermal resistance of the TO-220 package (T) is typically 4°C/W junction to case and 50°C/W case to ambient.

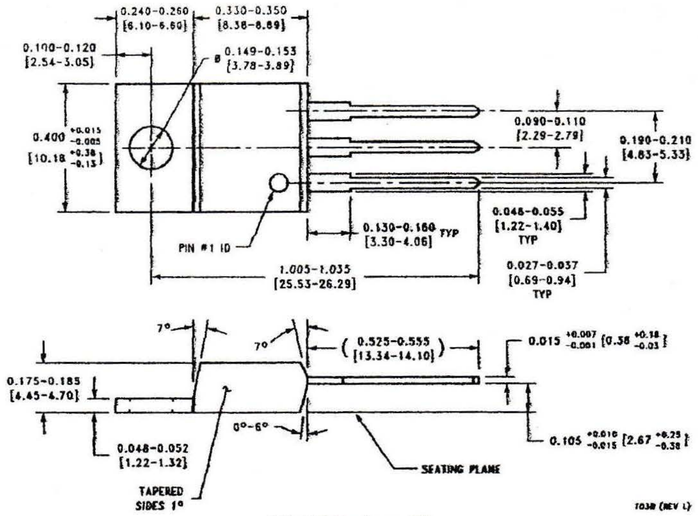
Note 2: All characteristics are measured with capacitor across the input of 0.22 μF, and a capacitor across the output of 0.1μF. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (t_w ≤ 10 ms, duty cycle ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.

Typical Performance Characteristics



TL/H/7746–4

Physical Dimensions inches (millimeters) (Continued)



TO-220 Package (T)
Order Number LM7805CT, LM7812CT or LM7815CT
NS Package Number T03B

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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