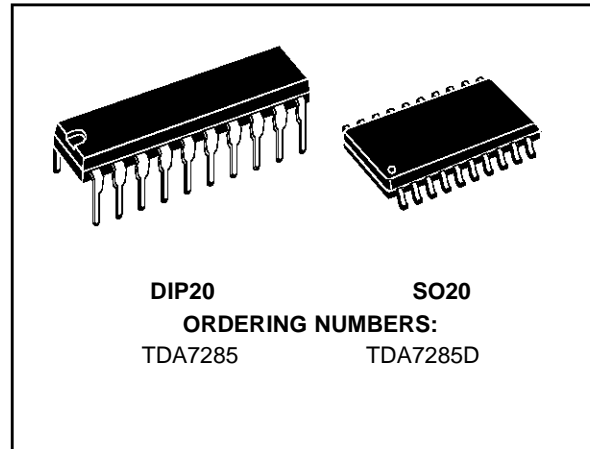


**STEREO CASSETTE PLAYER AND
MOTOR SPEED CONTROLLER**

ADVANCE DATA

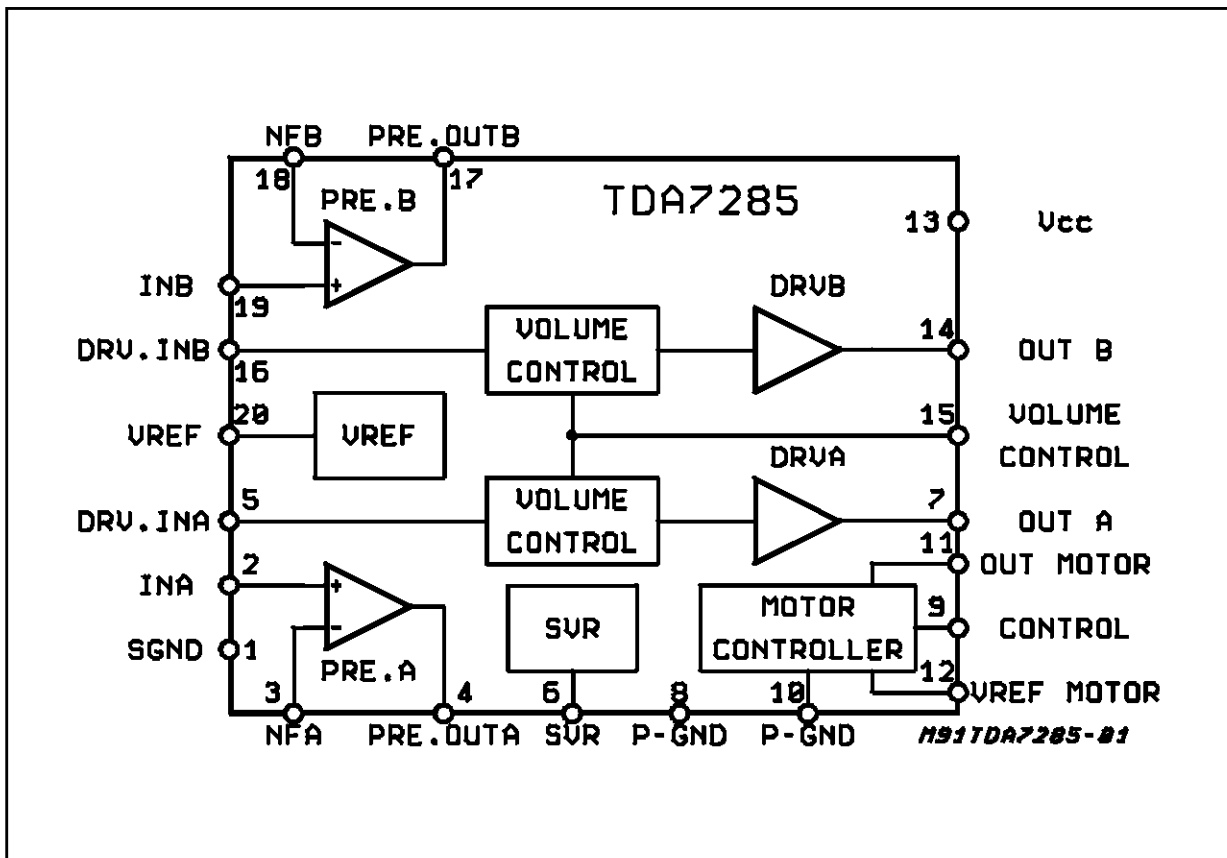
- WIDE OPERATING SUPPLY VOLTAGE (1.8V to 6V)
- HIGH OUTPUT POWER (30mW/32Ω/3V)
- LOW DISTORTION DC VOLUME CONTROL
- NO BOUCHEROT CELL
- LOW QUIESCENT CURRENT (15mA)
- NO INPUT CAPACITORS FOR PREAMPLIFIERS
- LOW MOTOR REFERENCE VOLTAGE (200mV)



DESCRIPTION

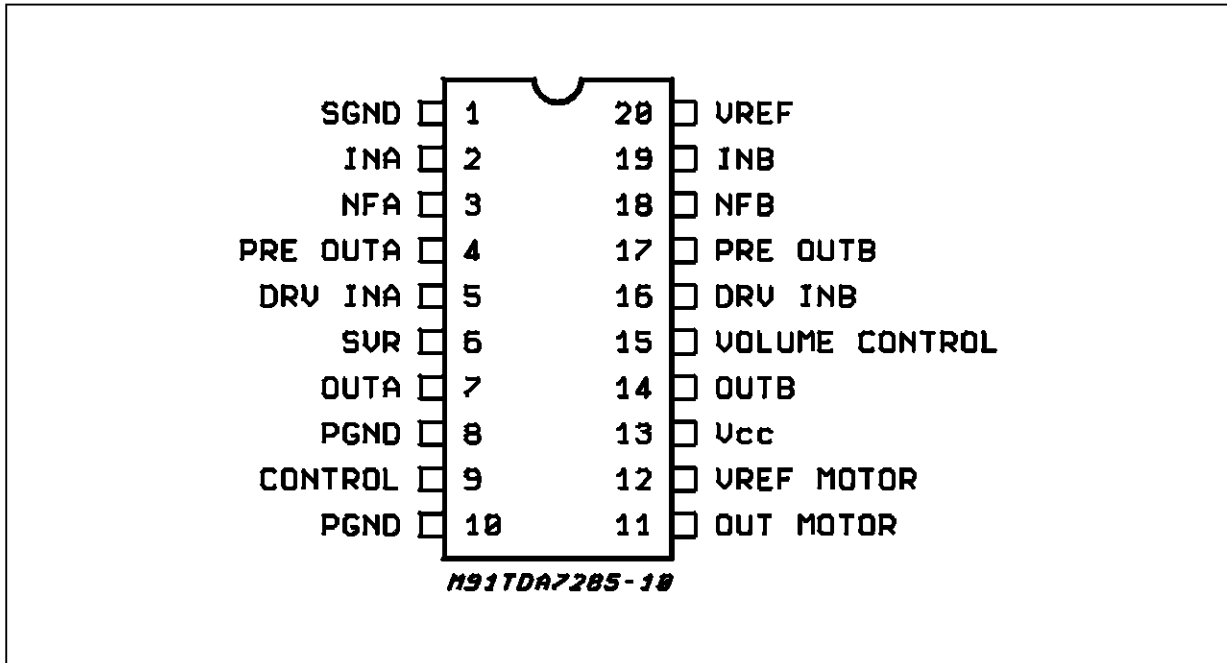
The TDA7285 is a monolithic integrated circuit designed for the portable players market and assembled in a plastic DIP20 and SO20. The internal functions are: preamplifier, DC volume control, headphone driver and motor speed controller.

BLOCK DIAGRAM



TDA7285

PIN CONNECTION (Top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	8	V
I_{Omax}	Maximum Output Current	70	mA
$I_{m\ max}$	Maximum Motor Current	700	mA
P_{tot}	Total Power Dissipation $T_{amb} = 90^\circ\text{C}$	0.9	W
T_{op}	Operating Temperature	-20 to +70	$^\circ\text{C}$
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	$^\circ\text{C}$

THERMAL DATA

Symbol	Description	SO20	DIP20	Unit
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	150	100	$^\circ\text{C/W}$

DC CHARACTERISTICS ($T_{amb} = 25^\circ\text{C}$; $V_S = 3\text{V}$; $R_L = 32\Omega$ (Headphone) and $R_L = 10\text{K}\Omega$ (Preamplifier); $V_i = 0$; VOL. Control = V_{ref}).

Terminal No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Term. Volt. (V)	0	1.5	1.5	1.5	1.5	2.7	1.4	0	2.8	0	1.6	3	3	1.4	1.5	1.5	1.5	1.5	1.5	1.5

ELECTRICAL CHARACTERISTICS ($V_S = 3V$; $R_L = 32\Omega$, Vol. Control = $2/3 V_{ref}$ (pin 20); $T_{amb} = 25^\circ C$; $f = 1KHz$; unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Range		1.8		6	V
I_d	Total Quiescent Drain Current			15	22	mA

PLAYBACK AMPLIFIER

G_{vo}	Open Loop Gain			70		dB
G_v	Close Loop Gain			33		dB
V_O	Output Voltage	THD = 1%	600	750		mV
THD	Total Harmonic Distortion	$V_O = 330mV_{rms}$		0.05	0.25	%
I_b	Bias Current			3		μA
C_t	Cross Talk	$R_S = 2.2K\Omega$; $V_O = 330mV_{rms}$		74		dB
e_n	Total Input Noise	$R_S = 2.2K\Omega$; $B = 22Hz$ to $22KHz$		1.2		μV
SVR1	Ripple Rejection	$R_S = 2.2K\Omega$; $V_r = 100mV_{rms}$ $f = 100Hz$; $C_{SVR} = 100\mu F$		50		dB

HEADPHONE DRIVER

V_{DC}	Output DC Voltage			1.4		V
P_O	Output Power	THD = 10%	20	30		mW
P_{O1}	Transient Output Power	THD = 10% $R_L = 16\Omega$		50		mW
G_v	Close Loop Gain	$P_O = 5mW$		31		dB
	Volume Control range		66	75		dB
THD	Total Harmonic Distortion	$P_O = 5mW$		0.3	1	%
C_t	Cross Talk	$P_O = 5mW$; $R_S = 10K\Omega$		50		dB
SVR2	Ripple Rejection	$R_S = 600\Omega$; $V_r = 100mV$ $f = 100Hz$; $C_{SVR} = 100\mu F$		47		dB

MOTOR SPEED CONTROL

V_{ref}	Motor Reference Voltage (pin 12)		0.18	0.20	0.22	V
K	Shunt Ratio	$I_m = 100mA$	45	50	55	-
V_{sat}	Residual Voltage	$I_m = 100mA$		0.13	0.30	V
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_S$	Line Regulation	$I_m = 100mA$; $V_S = 1.8$ to $6V$		0.20	0.8	%/V
$\frac{\Delta K}{K} / \Delta V_S$	Voltage Characteristics of Shunt Ratio	$I_m = 100mA$; $V_S = 1.8$ to $6V$		0.80	3	%/V
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta I_m$	Load Regulation	$I_m = 30$ to $200mA$		0.015	0.08	%/mA
$\frac{\Delta K}{K} / \Delta I_m$	Current Characteristics of Shunt Ratio	$I_m = 30$ to $200mA$		0.03	0.1	%/mA
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta T_{amb}$	Temperature Characteristics of Reference Voltage	$I_m = 100mA$ $T_{amb} = -20$ to $+60^\circ C$		0.04		%/°C
$\frac{\Delta K}{K} / \Delta T_{amb}$	Temperature Characteristics of Shunt Ratio	$I_m = 100mA$ $T_{amb} = -20$ to $+60^\circ C$		0.02		%/°C

TDA7285

Figure 1: Test and Application Circuit

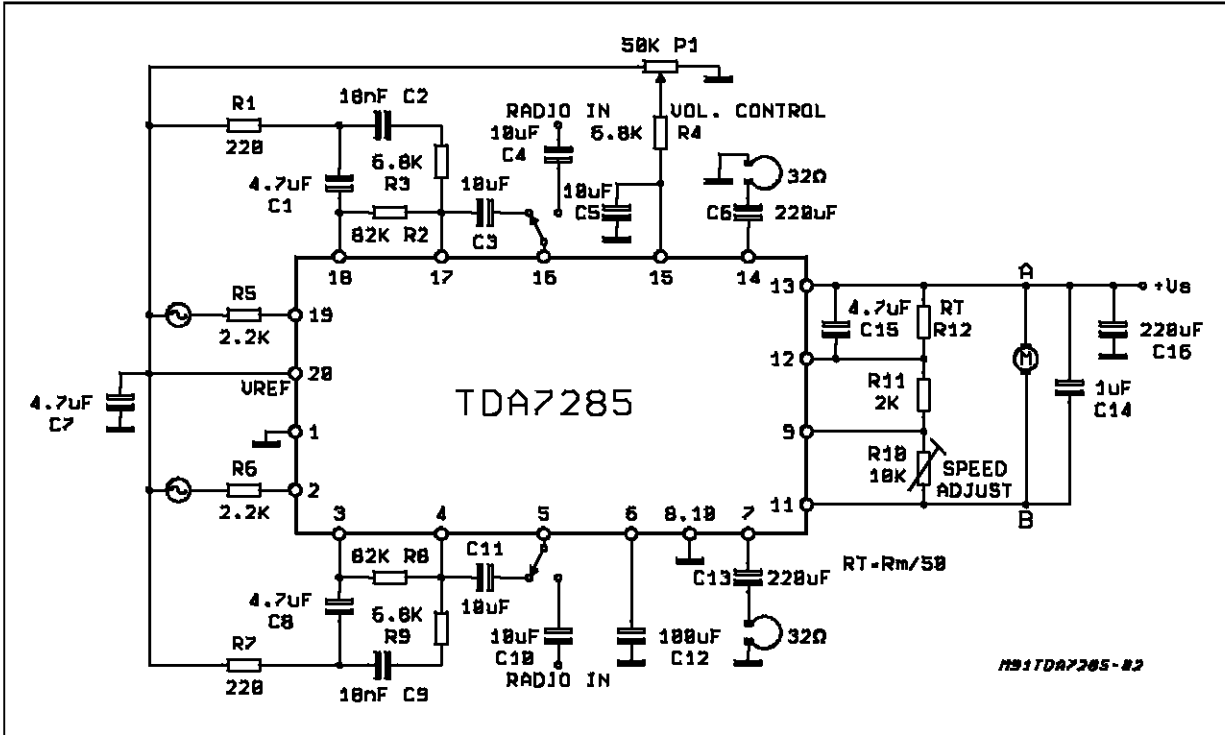


Figure 2: P.C. Board and Component Layout of the Circuit of Figure 2 (1:1 scale)

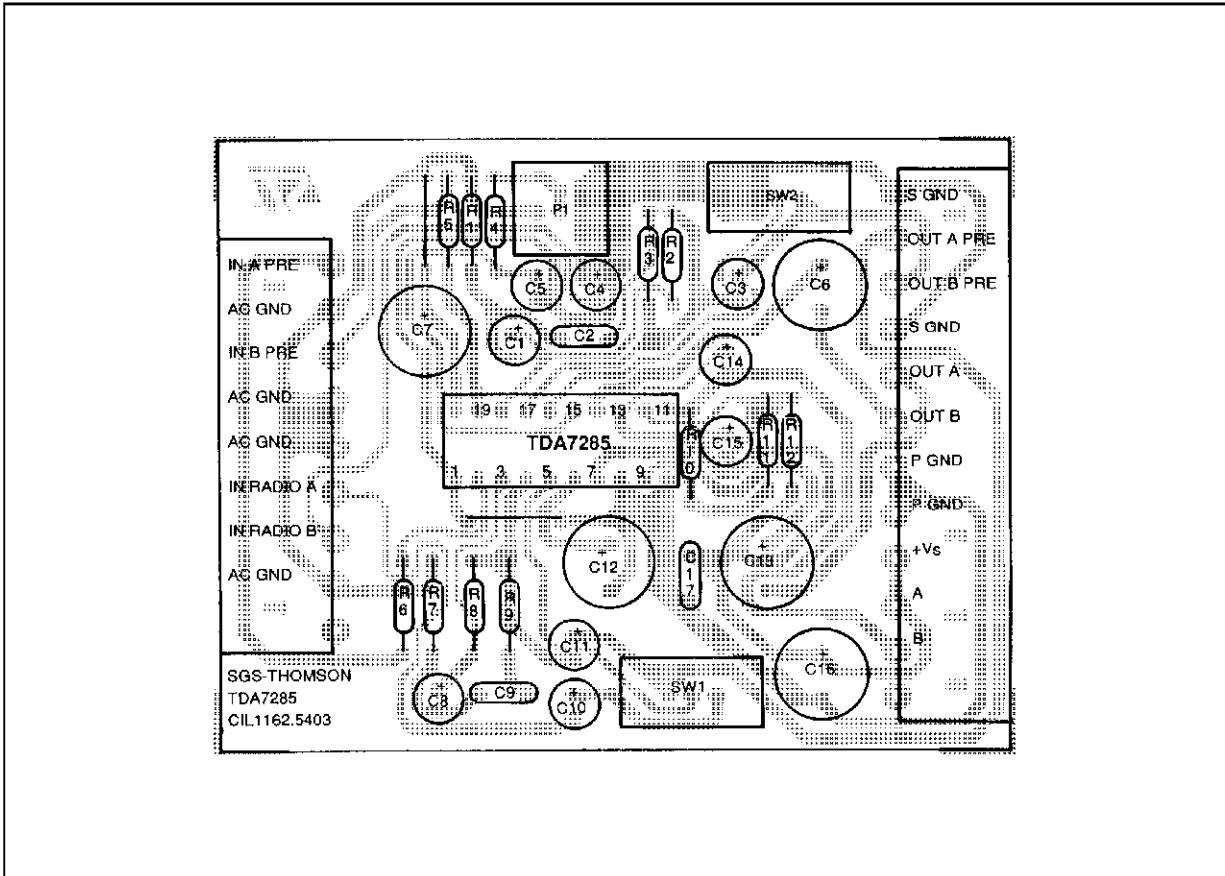


Figure 3: Quiescent Drain Current vs. Supply Voltage

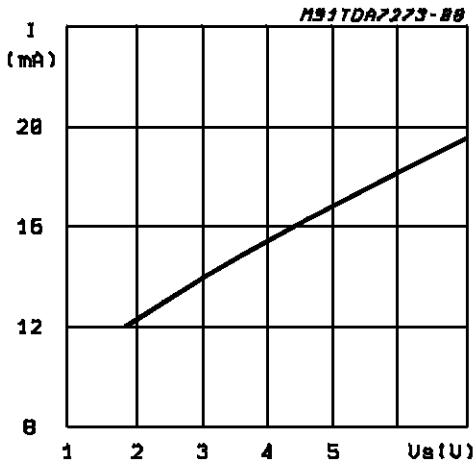


Figure 4: Reference voltage $V_{s/2}$ (pin 20) vs. Supply Voltage

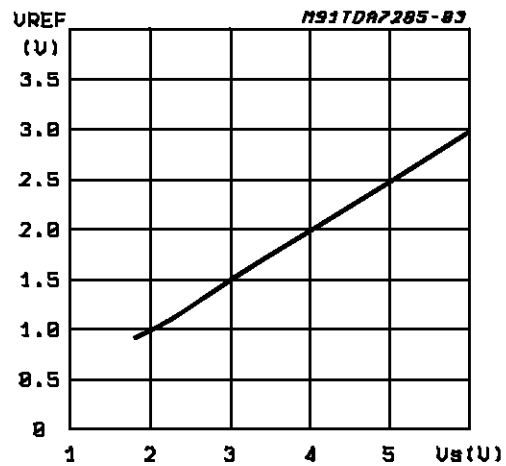


Figure 5: Closed Loop Gain vs. Frequency (PREAMPLIFIER)

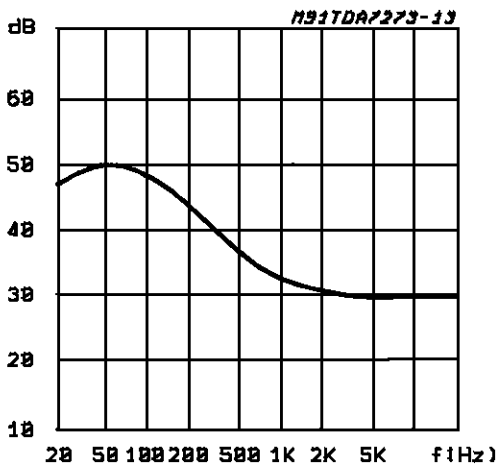


Figure 6: Distortion vs. Frequency (PREAMPLIFIER)

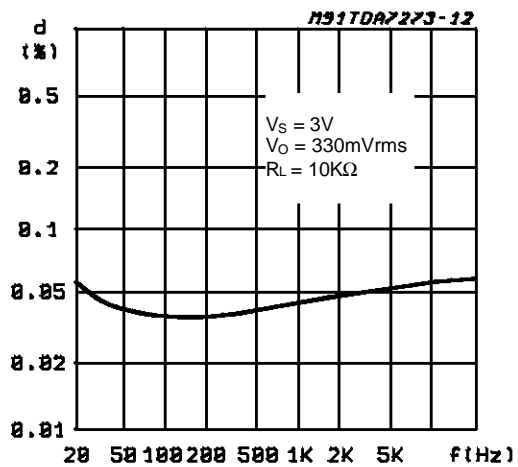


Figure 7: Supply Voltage Rejection vs. Frequency (PREAMPLIFIER)

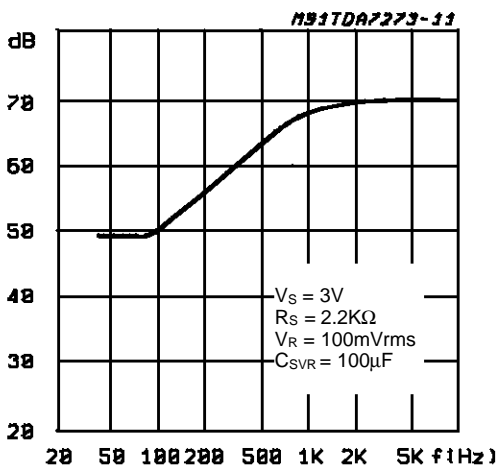


Figure 8: Quiescent Output Voltage vs. Supply Voltage (DRIVER)

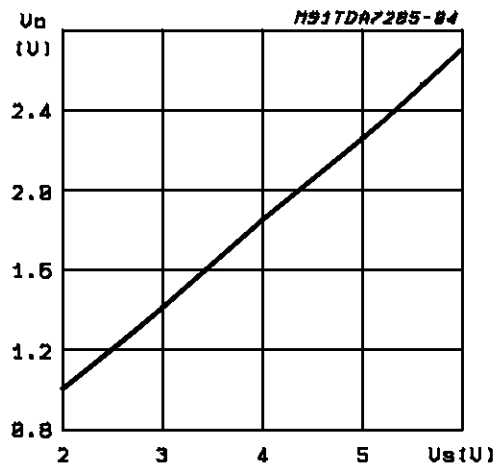


Figure 9: Closed Loop Gain vs. Frequency (DRIVER)

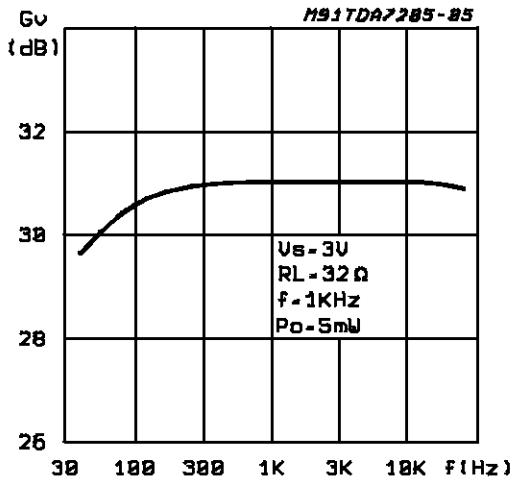


Figure 10: Output Power vs. Supply Voltage (DRIVER)

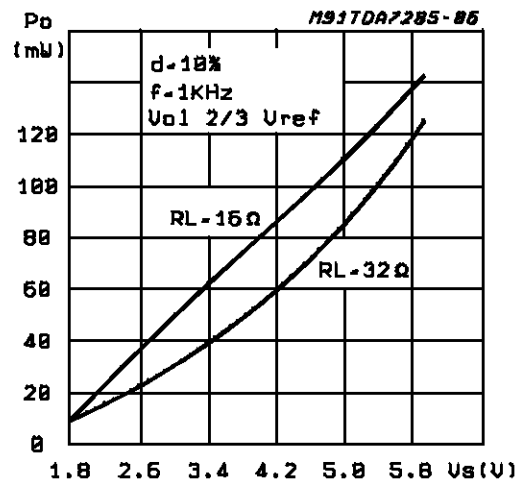


Figure 11: Distortion vs. Output Power (DRIVER)

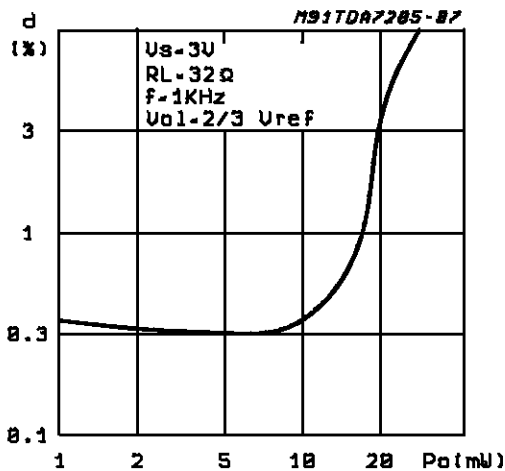


Figure 12: Distortion vs. Frequency (DRIVER)

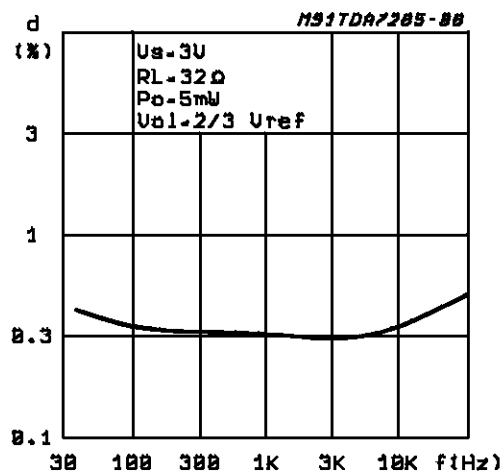


Figure 13: Supply Voltage Rejection vs. Frequency (DRIVER)

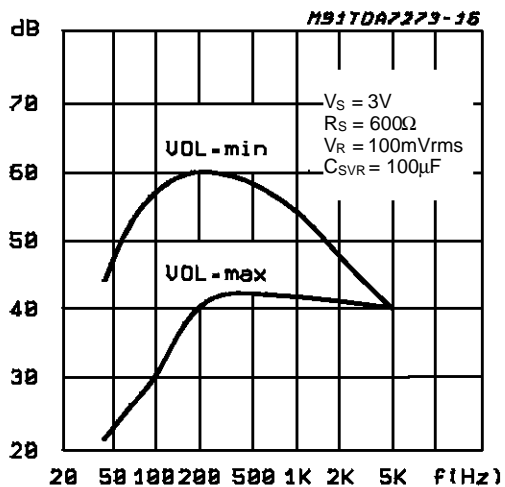


Figure 14: Volume Control (0dB = 10mW; $V_s = 3V$; $R_{VOL} = 50K\Omega$; $R_L = 32\Omega$; $f = 1KHz$) (DRIVER)

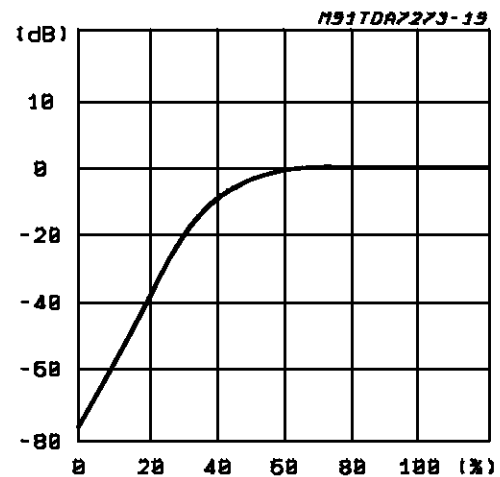


Figure 15: Reference Voltage (Pin 12) vs. Supply Voltage (MOTOR)

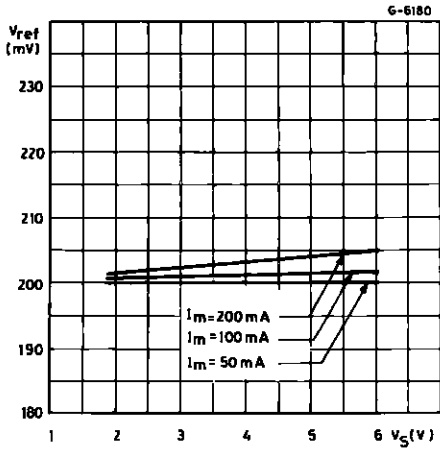


Figure 16: Shunt Ratio vs. Supply Voltage (MOTOR)

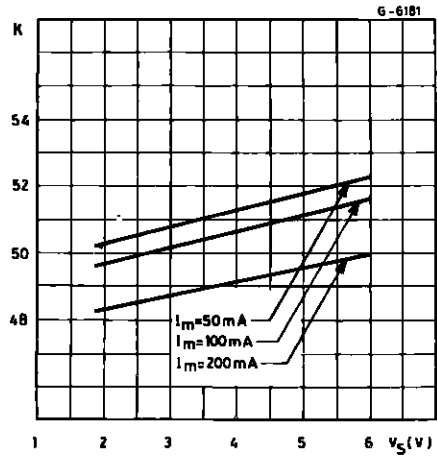


Figure 17: Shunt Ratio vs. Load Current (MOTOR)

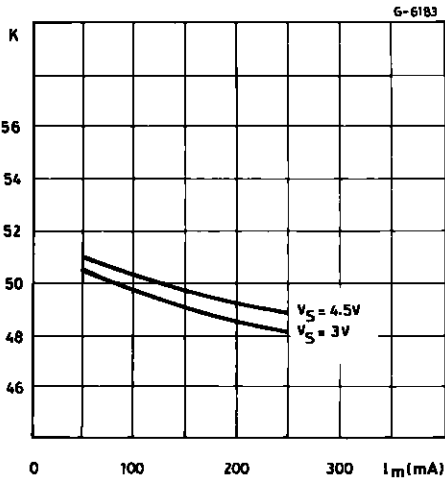


Figure 18: Saturation Voltage vs. Load Current (MOTOR)

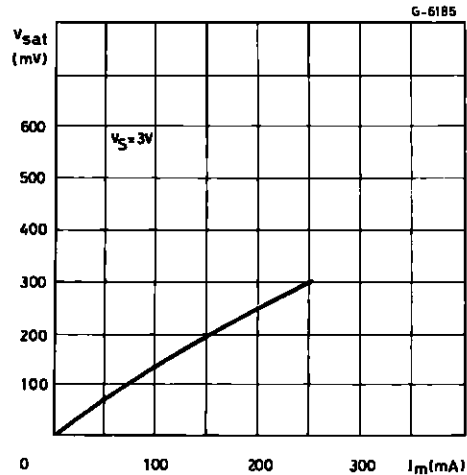


Figure 19: Speed Variations vs. Supply Voltage (MOTOR)

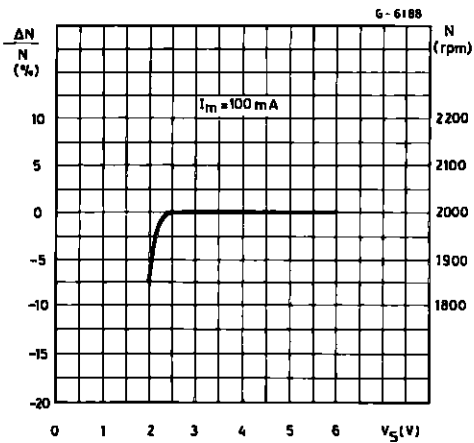
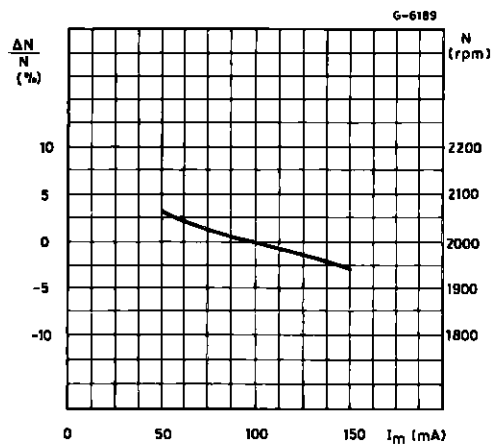
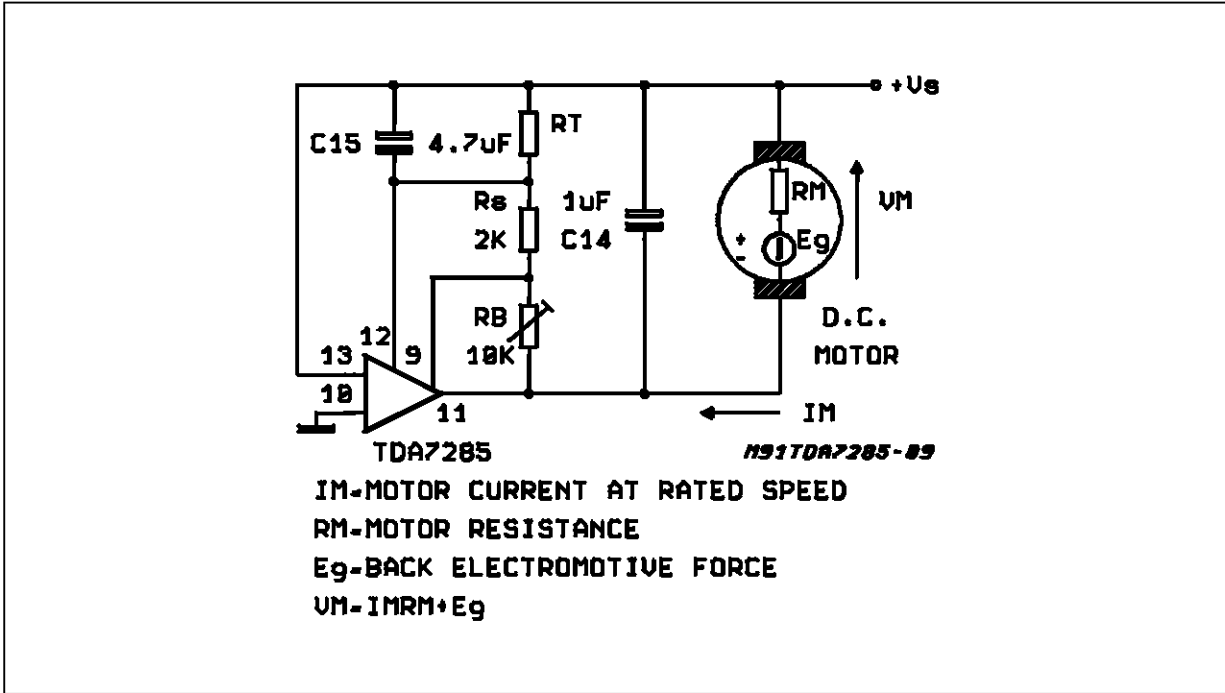


Figure 20: Speed Variations vs. Motor Current (MOTOR)



APPLICATION INFORMATION

Figure 21.



$$E_g = R_T I_d + I_M \left(\frac{R_T}{K} - R_M \right) + V_{ref}$$

$$\left[1 + \frac{R_b}{R_s} + \frac{R_T}{R_s} \left(1 + \frac{1}{K} \right) \right]$$

R_s has to be adjusted so that the applied voltage V_M is suitable for a given motor, the speed is then linearly adjustable varying R_B .

The value R_T is calculated so that

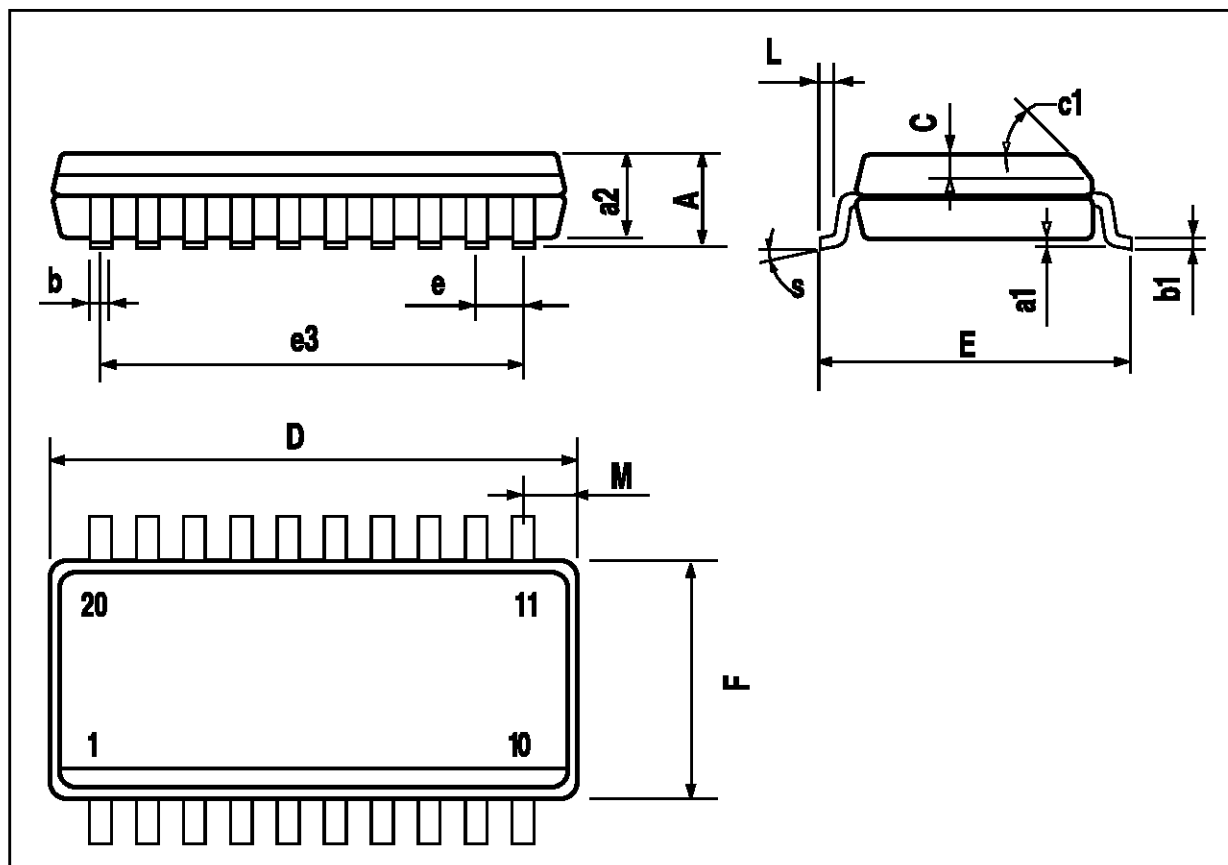
$$R_{T(max)} > K_{(min.)} * R_{M(min.)}$$

if $R_{T(max)} > K * R_M$, instability may occur.

The values of C_{15} ($4.7\mu F$ typ.) and C_{14} ($1\mu F$ typ.) depend on the type of motor used. C_{15} adjusts WOW and flutter of the system. C_{14} suppresses motor spikes.

SO20 PACKAGE MECHANICAL DATA

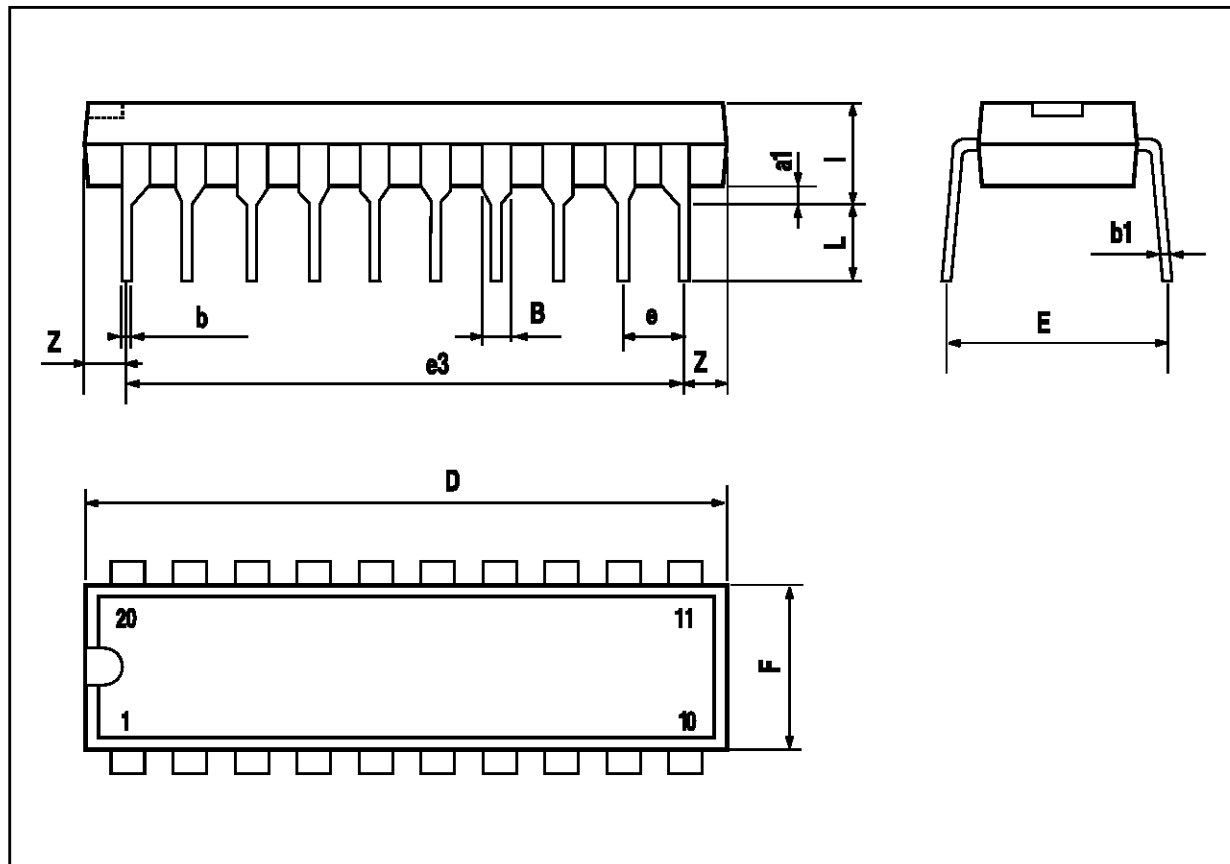
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.3	0.004		0.012
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.013
C		0.5			0.020	
c1	45 (typ.)					
D	12.6		13.0	0.496		0.512
E	10		10.65	0.394		0.419
e		1.27			0.050	
e3		11.43			0.450	
F	7.4		7.6	0.291		0.299
L	0.5		1.27	0.020		0.050
M			0.75			0.030
S	8 (max.)					



TDA7285

DIP20 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.254			0.010		
B	1.39		1.65	0.055		0.065
b		0.45			0.018	
b1		0.25			0.010	
D			25.4			1.000
E		8.5			0.335	
e		2.54			0.100	
e3		22.86			0.900	
F			7.1			0.280
I			3.93			0.155
L		3.3			0.130	
Z			1.34			0.053



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