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TDA2009A

10 +10W STEREO AMPLIFIER

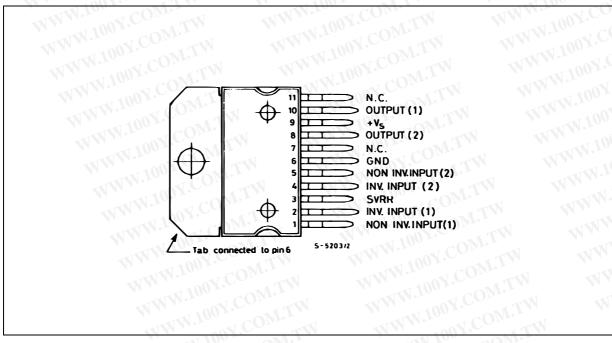
- HIGH OUTPUT POWER
- (10 + 10W Min. @ D = 1%)
- HIGH CURRENT CAPABILITY (UP TO 3.5A)
- AC SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION
- SPACE AND COST SAVING : VERY LOW NUMBER OF EXTERNAL COMPONENTS AND SIMPLE MOUNTING THANKS TO THE MULTIWATT [®] PACKAGE.



DESCRIPTION

The TDA2009A is class AB dual Hi-Fi Audio power amplifier assembled in Multiwatt [®] package, specially designed for high quality stereo application as Hi-Fi and music centers.

PIN CONNECTION



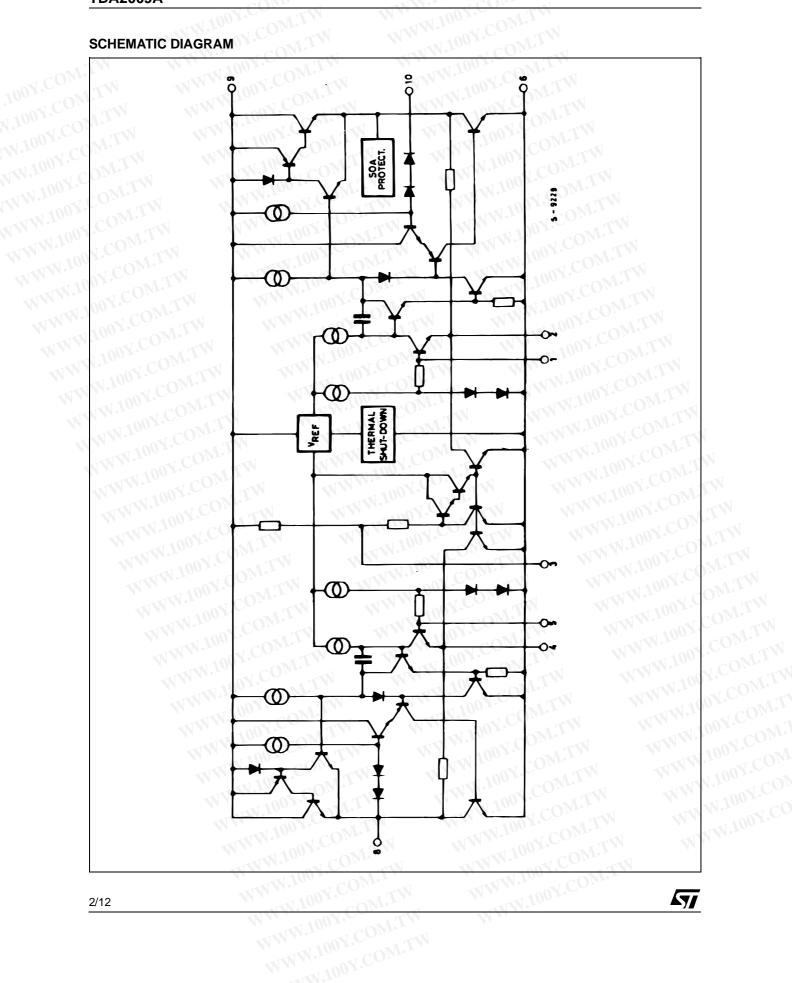
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SCHEMATIC DIAGRAM

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COM.T ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
Vs	Supply Voltage	28	V
lo	Output Peak Current (repetitive f ≥ 20 Hz)	3.5	Α
lo	Output Peak Current (non repetitive, t = 100 μs)	4.5	А
P _{tot}	Power Dissipation at T _{case} = 90 °C	20	W
T _{stg,} T _j	Storage and Junction Temperature	- 40, + 150	°C

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HERMAL	DATA			
Symbol	Parameter	WWW.	Value	Unit
Rth j-case	Thermal Resistance Junction-case	Max.	3	°C/W

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ELECTRICAL CHARACTERISTICS (refer to the stereo appliest) WT.MO (refer to the stereo application circuit, T_{amb} = 25°C, V_S = 24V, G_V = 36dB, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Vs	Supply Voltage	OW. WWW	8		28	V V
Vo	Quiescent Output Voltage	$V_s = 24V$	1.700	11.5	Wr.	V
la V	Total Quiescent Drain Current	$V_s = 24V$	N.10	60	120	mA
P₀ 100	Output Power (each channel)	$d = 1\%, V_s = 24V, f = 1kHz$ $R_L = 4\Omega$ $R_L = 8\Omega$ f = 40Hz to 12.5kHz	N.M.	12.5 7	COM COM	WW
	OY.COM.TW WWW.I	$R_{L} = 4\Omega$ $R_{L} = 8\Omega$ $V_{s} = 18V, f = 1kHz$	10 5	.1007	v.CO	WW
	LOOLCONLTW WWW	$R_{L} = 4\Omega$ $R_{L} = 8\Omega$	WW	7 4	oy.C	W W
d	Distortion (each channel)		AA	0.2 0.1	.voo	% %
W	W.1002.COM.I		V	0.2 0.1	100	% %
СТ	Cross Talk (3)	$\begin{array}{l} R_{L} = \infty, R_{g} = 10 \mathrm{k}\Omega \\ f = 1 \mathrm{k} \mathrm{Hz} \\ f = 10 \mathrm{k} \mathrm{Hz} \end{array}$		60 50	W.10	dB
Vi	Input Saturation Voltage (rms)	CONT.	300		NN'I	mV
Ri	Input Resistance	f = 1kHz, Non Inverting Input	70	200	W	kΩ
f∟	Low Frequency Roll off (- 3dB)	$R_L = 4\Omega$		20		Hz
f _H	High Frequency Roll off (- 3dB)	$R_L = 4\Omega$	N	80 🔹	NN.	kHz
Gv	Voltage Gain (closed loop)	f = 1kHz	35.5	36	36.5	dB
ΔG_v	Closed Loop Gain Matching	W.100 COM.		0.5		dB
e _N	Total Input Noise Voltage	$ \begin{array}{l} R_{g} = 10 k \Omega \; (1) \\ R_{g} = 10 k \Omega \; (2) \end{array} $	TW	1.5 2.5	8	μV μV
SVR	Supply Voltage Rejection (each channel)	$ \begin{array}{l} R_{g} = 10 k \Omega \\ f_{ripple} = 100 Hz, V_{ripple} = 0.5 V \end{array} $	1.1	55		dB
TJ	Thermal Shut-down Junction Temperature	NWW.100 - CC	Nr	145		°C

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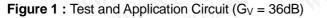
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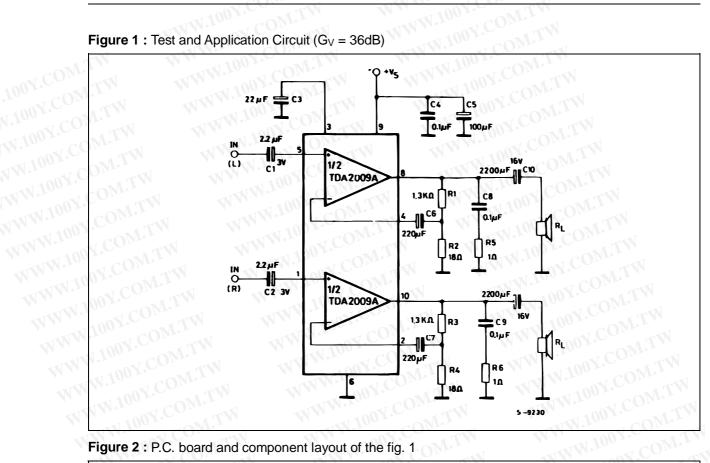
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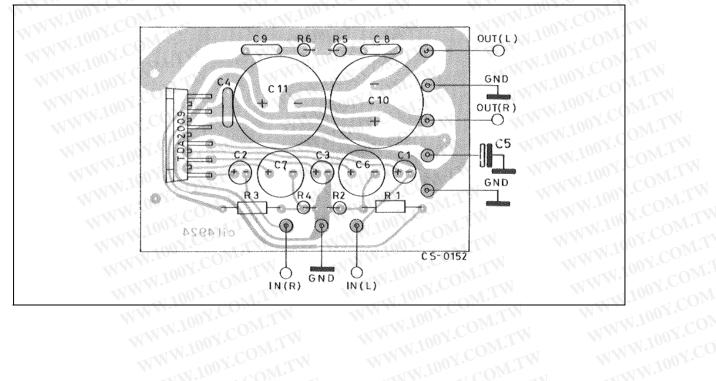
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Figure 2 : P.C. board and component layout of the fig. 1



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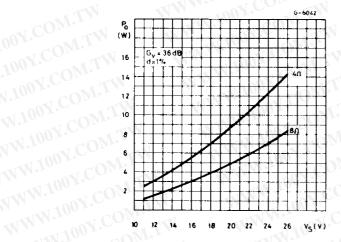
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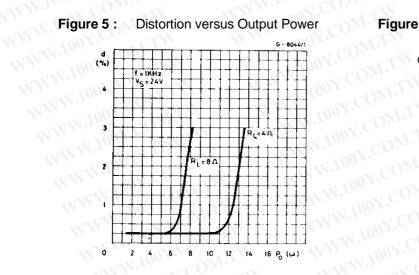
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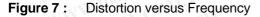
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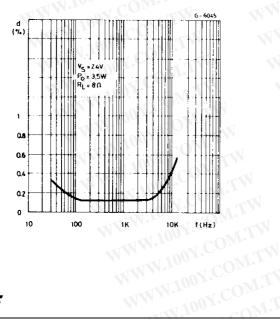
Output Power versus Supply Voltage Figure 3 :



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Output Power versus Supply Voltage Figure 4 :

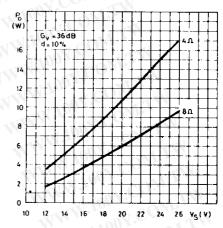
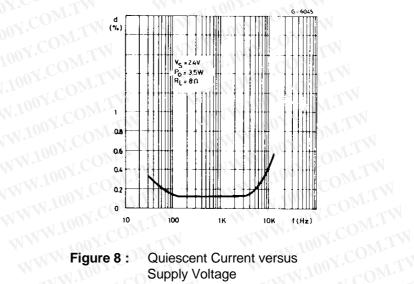


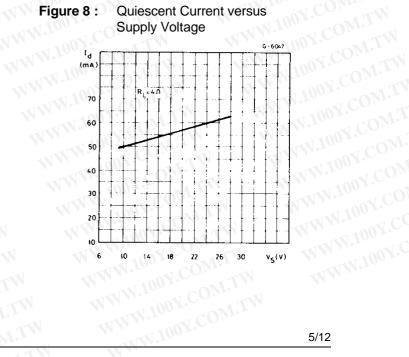
Figure 6 :

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Distortion versus Frequency



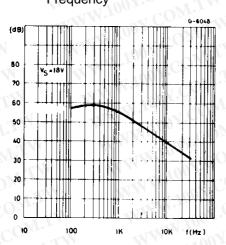
WWW.100Y.C Figure 8 : **Quiescent Current versus** WWW.10 Supply Voltage



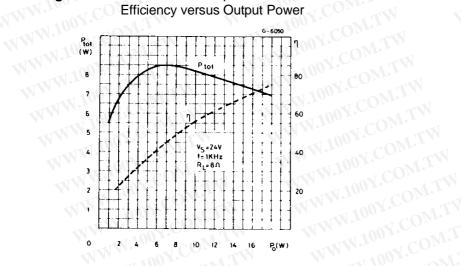
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Figure 9 : Supply Voltage Rejection versus Frequency

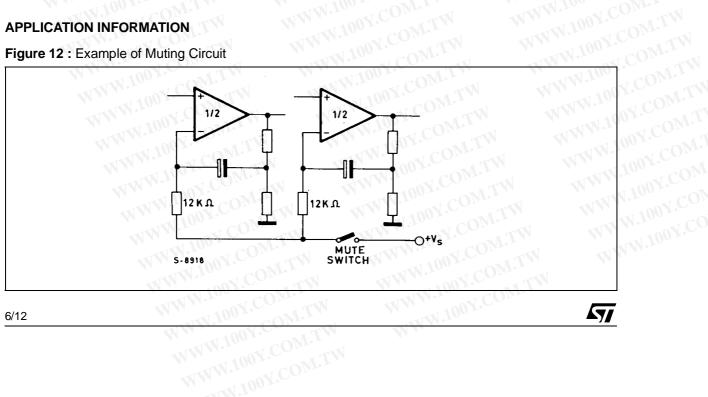


WWW.100Y.C Total Power Dissipation and Efficiency versus Out Figure 11 :



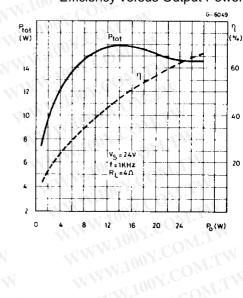
APPLICATION INFORMATION

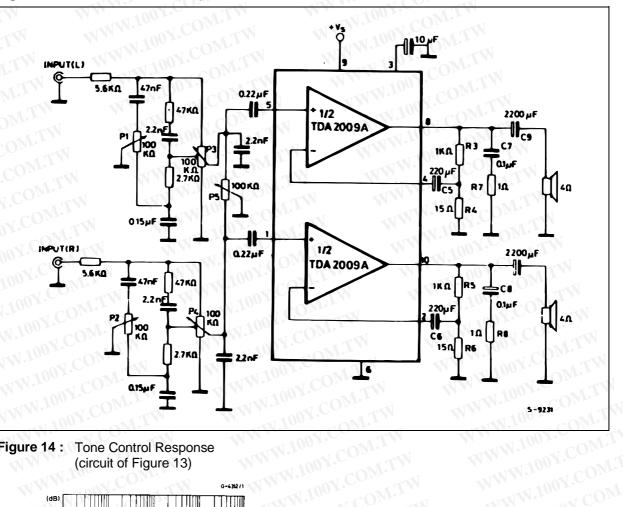
Figure 12 : Example of Muting Circuit



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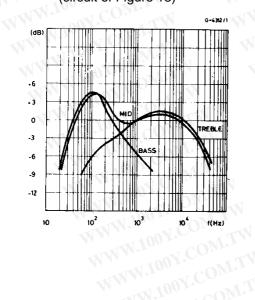


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Figure 13: 10W +10W Stereo Amplifier with Tone Balance and Loudness Control

Figure 14 : Tone Control Response (circuit of Figure 13)

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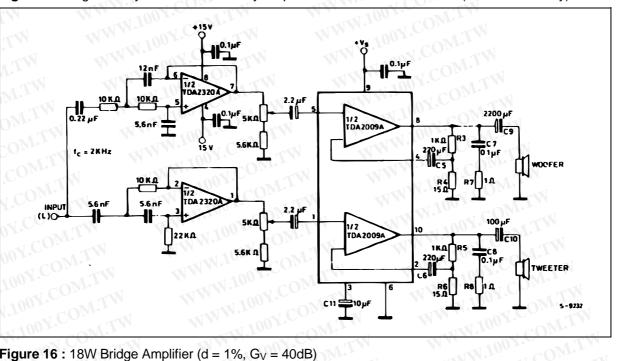
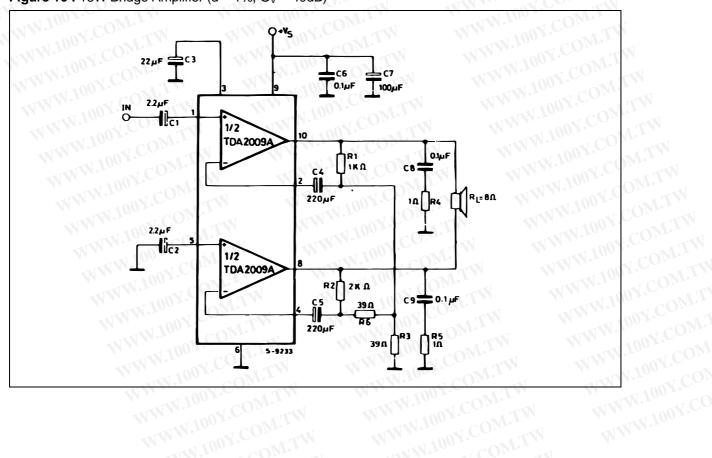


Figure 15 : High Quality 20 + 20W Two Way Amplifier for Stereo Music Center (one channel only)

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Figure 16 : 18W Bridge Amplifier (d = 1%, $G_V = 40$ dB)



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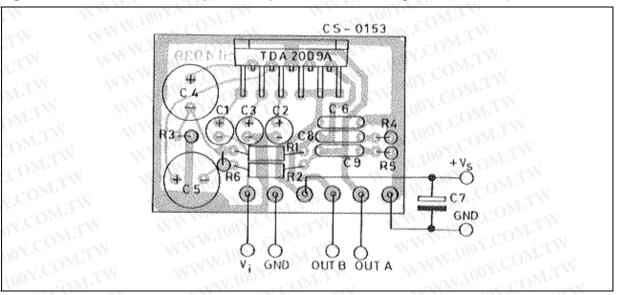


Figure 17 : P.C. BOARD and Components Layout of the Circuit of Figure 16 (1:1 scale)

APPLICATION SUGGESTION

The recommended values of the components are those shown on application circuit of fig. 1. Different values can be used; the following table can help the designer.

Component	Recommended Value	Purpose	Larger than	Smaller than	
R1, R3	1.2kΩ	Close Loop Gain	Increase of Gain	Decrease of Gain	
R2, R4	18kΩ	Setting (1)	Decrease of Gain	Increase of Gain	
R5, R6		Frequency Stability	Danger of Oscillation at High Frequency with Inductive Load	WWW.100Y.COM.	
C1, C2	2.2µF	Input DC Decoupling	High Turn-on Delay	High Turn-on Pop. Higher Low Frequency Cut-off. Increase of Noise	
C3	22µF	Ripple Rejection	Better SVR. Increase of the Switch-on Time	Degradation of SVR	
C6, C7	220µF	Feedback Input DC Decoupling	W.100 Y.COM. TW	WWW.100Y.C	
C8, C9	0.1µF	Frenquency Stability	NW.ICE CON.	Danger of Oscillation	
C10, C11	1000μF to 2200μF	Output DC Decoupling	WW.100 Y.COM.I.	Higher Low-frequency Cut-off	

BUILD-IN PROTECTION SYSTEMS THERMAL SHUT-DOWN

The presence of a thermal limiting circuit offers the following advantages:

- 1) an averload on the output (even if it is permanent), or an excessive ambient temperature can be easily withstood.
- 2) the heatsink can have a smaller factor of safety compared with that of a conventional circuit. There is no device damage in the case of excessive junction temperature : all that happens is that Po (and therefore Ptot) and Io are reduced.

The maximum allowable power dissipation depends upon the size of the external heatsink (i.e. its thermal resistance); Figure 18 shows this dissipable power as a function of ambient temperature for different thermal resistance.

Short circuit (AC Conditions). The TDA2009A can withstand an accidental short circuit from the output and ground made by a wrong connection during normal play operation.

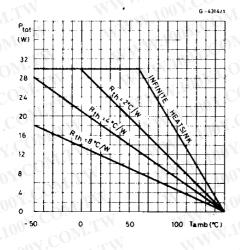


MOUNTING INSTRUCTIONS

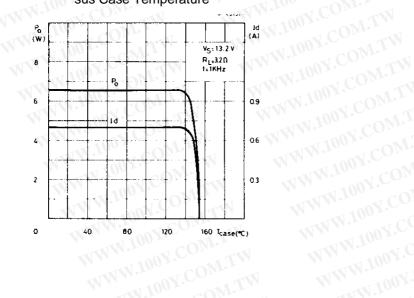
The power dissipated in the circuit must be removed by adding an external heatsink.

Thanks to the MULTIWATT ® package attaching

Figure 18 : Maximum Allowable Power Dissipation versus Ambient Temperature



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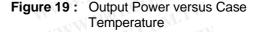
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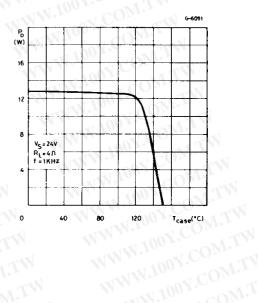
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the heatsink is very simple, a screw or a compression spring (clip) being sufficient. Between the heatsink and the package it is better to insert a layer of silicon grease, to optimize the thermal contact ; no electrical isolation is needed between the two



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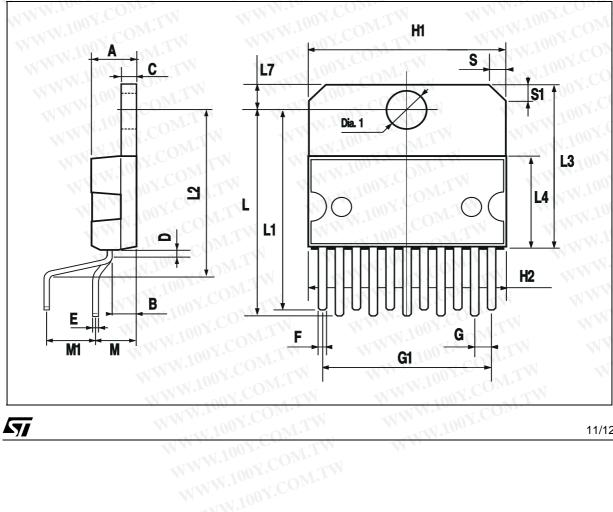
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DIM.	N	mm		inch			
N	MIN.	TYP.	MAX.	MIN.	TYP.	MAX	
А		WIT	5	SI CO		0.197	
В			2.65	C	M.L	0.104	
С		An	1.6	01.0	CAR	0.063	
D		1	14.2	.Va	0.039	W	
E	0.49		0.55	0.019	COM	0.022	
F.T	0.88		0.95	0.035	100	0.037	
G	1.45	1.7	1.95	0.057	0.067	0.077	
G1	16.75	17	17.25	0.659	0.669	0.679	
H1	19.6			0.772		DMr.	
H2	1.1.1		20.2	.W.1	01.	0.795	
4	21.9	22.2	22.5	0.862	0.874	0.886	
L1	21.7	22.1	22.5	0.854	0.87	0.886	
L2	17.4		18.1	0.685	.700	0.713	
L3	17.25	17.5	17.75	0.679	0.689	0.699	
L4	10.3	10.7	10.9	0.406	0.421	0.429	
L7	2.65	Nr.	2.9	0.104	N	0.114	
М	4.25	4.55	4.85	0.167	0.179	0.191	
M1	4.73	5.08	5.43	0.186	0.200	0.214	
S	1.9	7.1	2.6	0.075		0.102	
S1	1.9	ONr.	2.6	0.075	WWW	0.102	
Dia1	3.65	Mor	3.85	0.144		0.152	

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