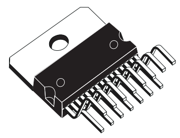
TDA7376B

2 x 35W POWER AMPLIFIER FOR CAR RADIO

- HIGH OUTPUT POWER CAPABILITY:
  2 x 40W max./4Ω
  2 x 35W/4Ω EIAJ
  2 x 25W4Ω @ 14.4V, 1KHz, 10%
  2 x 37W2Ω @ 14.4V, 1KHz, 10%
- 2Ω DRIVING
- DIFFERENTIAL INPUTS
- MINIMUM EXTERNAL COMPONENT COUNT
- INTERNALLY FIXED GAIN (26dB)
- MUTE FUNCTION (CMOS COMPATIBLE)
- AUTOMUTE AT MINIMUM SUPPLY VOLTAGE DETECTION
- STAND-BY FUNCTION
- NO AUDIBLE POP DURING MUTE AND ST-BY OPERATIONS
- CLIPPING DETECTOR WITH PROGRAMMABLE DISTORTION THRESHOLD

PROTECTIONS:

- SHORT CIRCUIT (OUT TO GROUND, OUT TO SUPPLY VOLTAGE, ACROSS THE LOAD)
- OVERRATING CHIP TEMPERATURE WITH SOFT THERMAL LIMITER
- LOAD DUMP VOLTAGE
- FORTUITOUS OPEN GROUND
- LOUDSPEAKER DC CURRENT
- ESD



MULTIWATT15

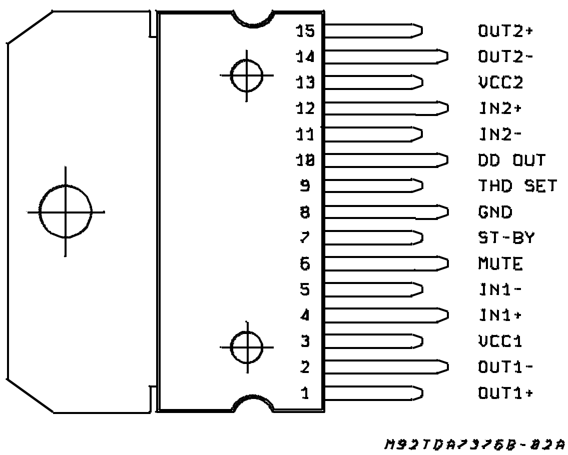
ORDERING NUMBER: TDA7376B

DESCRIPTION

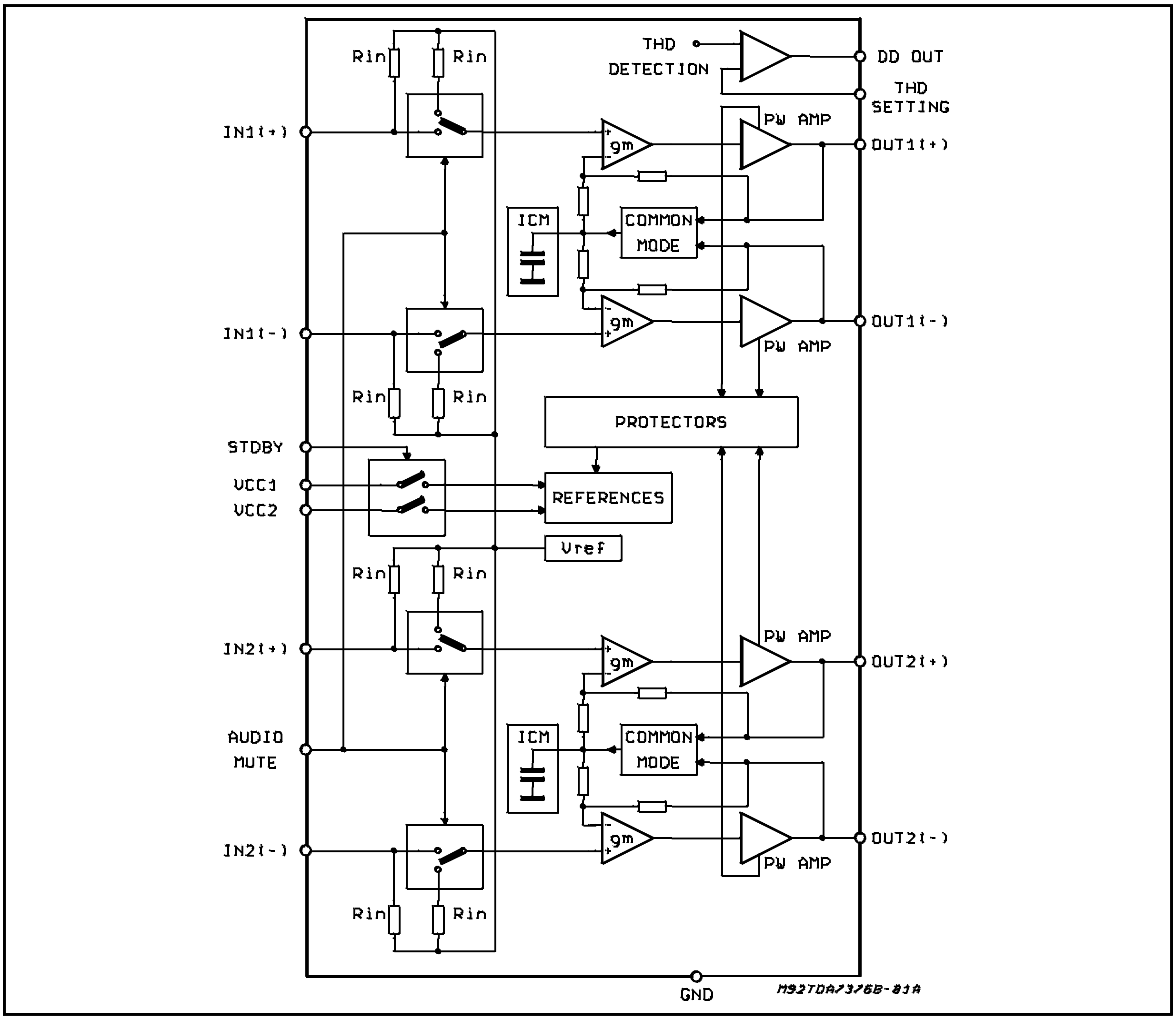
The TDA7376B is a new technology dual bridge Audio Amplifier in Multiwatt 15 package designed for car radio applications. Thanks to the fully complementary PNP/NPN output stage configuration the TDA7376B delivers a rail-to-rail voltage swing with no need of bootstrap capacitors. Differential input pairs, that will accept either single ended or differential input signals, guarantee high noise immunity making the device suitable for both car radio and car boosters applications.

The audio mute control, that attenuates the output signal of the audio amplifiers, suppresses pop on - off transients and cuts any noises coming from previous stages. The St-By control, that debiases the amplifiers, reduces the cost of the power switch. The on-board programmable distortion detector allows compression facility whenever the ampifier is overdriven, so limiting the distortion at any levels inside the presettable range.

PIN CONNECTION (Continued)



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{OP}	Operating Supply Voltage	18	V
V_S	DC Supply Voltage	28	V
V_{peak}	Peak Supply Voltage (t = 50ms)	50	V
I_O	Output Peak Current (non rep. t = 100µs) Output Peak Current (rep. f > 10Hz)	8 6	A A
P_{tot}	Power Dissipation at T_{case} = 85°C	36	W
T_{stg}, T_j	Storage and Junction Temperature	–40 to 150	°C

THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case max.	1.8	°C/W

Figure 1: Differential Inputs Test and Application Circuit

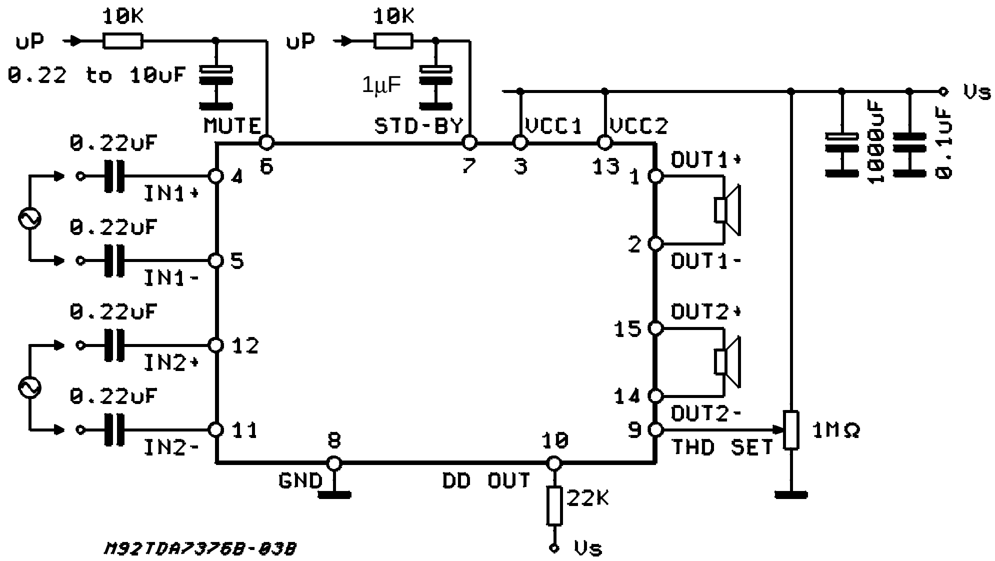


Figure 2: Single Ended Inputs Test and Application Circuit

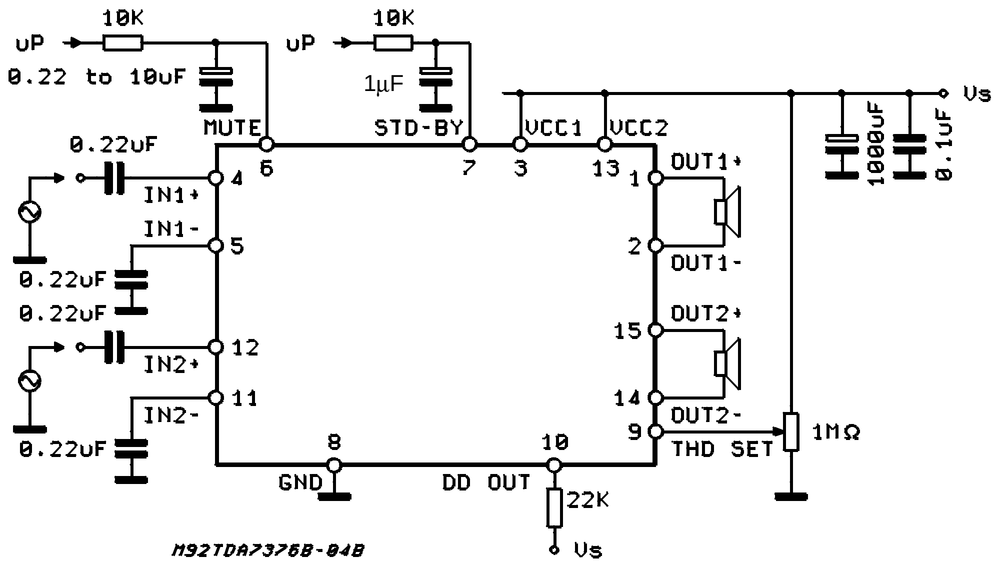


Figure 3: Application Board Reference Circuit

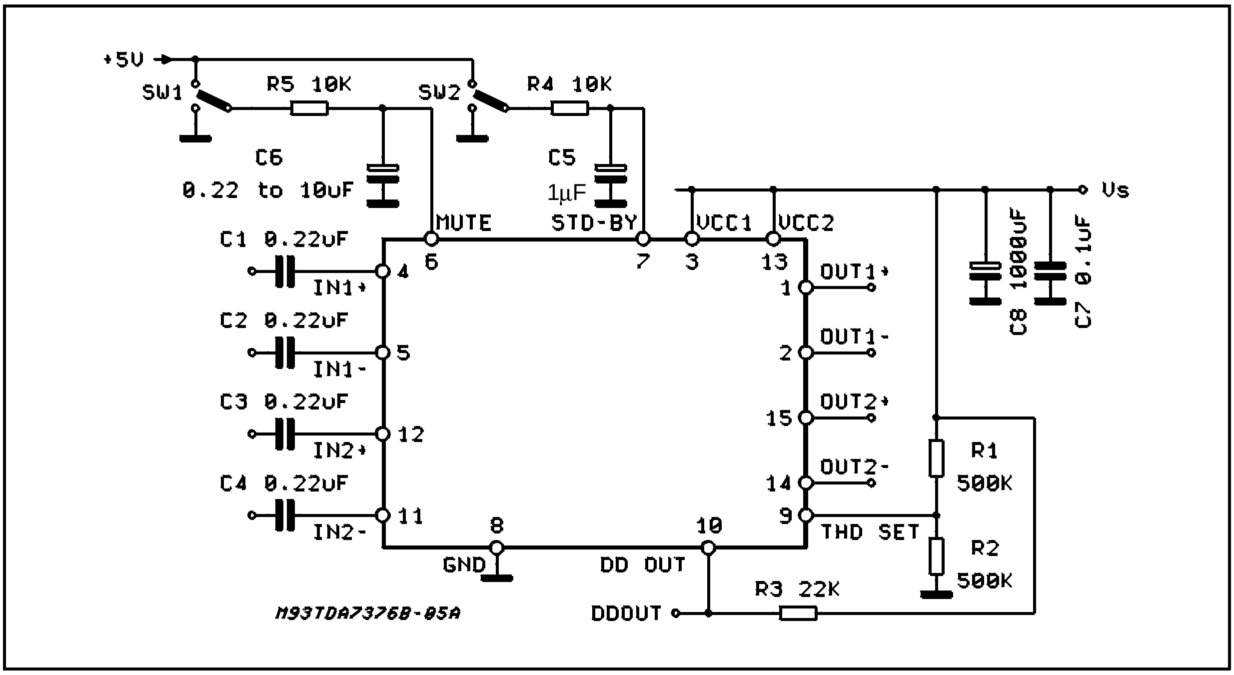
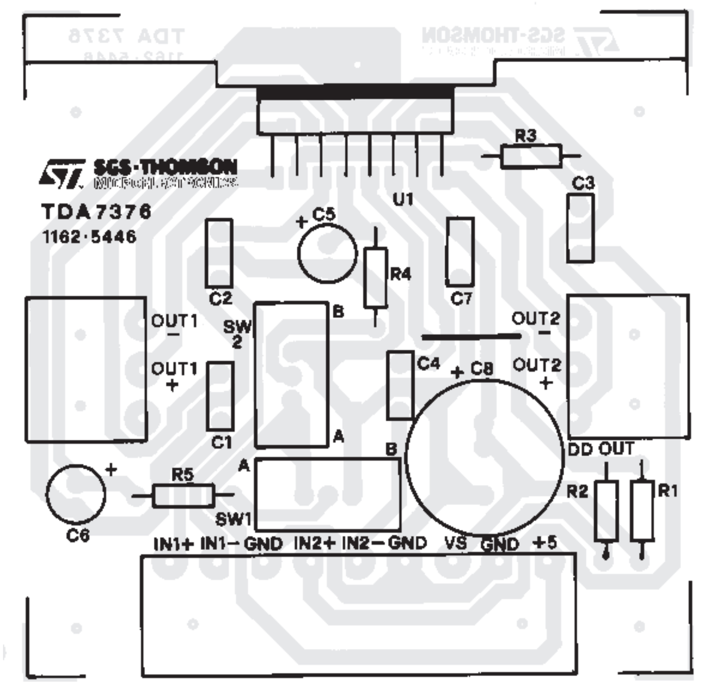


Figure 4: P.C. Board and Components Layout of the Circuit of Fig. 3 (1:1 scale)



ELECTRICAL CHARACTERISTICS (Refer to the test fig. 1 and 2 circuit, T_{amb} = 25°C; V_S = 14.4V; f = 1KHz; R_L = 4Ω; unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage		8		18	V
I_d	Total Quiescent Drain Current	$R_L = \infty$			200	mA
V_{OS}	Output Offset Voltage				120	mV
P_O	Output Power	THD = 10% THD = 10%, R_L 2Ω	23 33	25 37		W W
$P_{O\ max}$	Max. Output Power (*)	VS = 14.4V	36	40		W
$P_{O\ EIAJ}$	EIAJ Output Power (*)	V_S = 13.7V	32	35		W
THD	Distortion	P_O = 0.5 to 10W P_O = 0.5 to 15W		0.03 0.08	0.3 0.5	% %
C_T	Cross Talk	f = 1KHz; Rg = 0 f = 10KHz; Rg = 0		80 70		dB dB
R_{IN}	Input Resistance	differential input single ended input	45 40			KΩ KΩ
G_V	Voltage Gain	differential input single ended input	25 25	26 26	27 27	dB dB
ΔG_V	Channel Gain Balance				1	dB
E_N	Input Noise Voltage	Rg = 600Ω; "A Weighted" Rg = 600Ω; 22Hz to 22KHz		3 4	 6	μV μV

SVR	Supply Voltage Rejection	f = 100Hz; Vr = 1Vrms;
		Rg = 0
		f = 10KHz; Vr = 1Vrms;
		Rg = 0
			45	
				
				55
						dB
						
						dB

BW	Power Bandwidth	(–3dB)	75			KHz
CMRR	Common Mode Rejection Ratio	V_{CM} = 1Vrms input referred	60			dB
A_{SB}	Stand-by Attenuation	V_{SB} = 1.5V; P_{Oref} = 1W	80	90		dB
$V_{sb\ IN}$	Stand-by in Threshold				1.5	V
$V_{sb\ OUT}$	Stand-by out Threshold		3.5			V
I_{sb}	Stand-by Current Consumption				100	μA
A_M	Mute Attenuation	V_M = 1.5V; P_{Oref} = 1W		85		dB
$V_{M\ IN}$	Mute in Threshold				1.5	V
$V_{M\ OUT}$	Mute out Threshold		3.5			V
I_6	Mute pin Current	V6 = 0 to V_S, ; $V_{S\ max.}$ = 18V			100	μA
D_{DL}	Distortion Detection Level (**)		3.5			%
D_{DOUT}	Distortion Detector Output DC Current	Output low, sinked current (V_{pin10} = 1.5V)	1			mA
		Output high, leakage current (V_{pin10} = V_S, @ V_{Smax} = 18V)			10	μA

(*) Saturated square wave output
(**) see figure 5 for THD setting.

The TDA7376B is equipped with a programmable clipping distortion detector circuitry that allows to signal out the output stage saturation by providing a current sinking into an open collector output (DDout) when the total harmonic distortion of the output signal reaches the preset level. The desired threshold is fixed through an external divider that produces a proper voltage level across the THD set pin. Fig. 5 shows the THD detection threshold versus the THD set voltage. Since it is essential that the THD set voltage be proportional to the supply voltage, fig. 5 shows its value as a fraction of V_{CC}. The actual voltage can be computed by multiplying the fraction corresponding to the desired THD threshold by the application's supply voltage.

Figure 5: Clip Detector Threshold vs. THD set. Voltage.

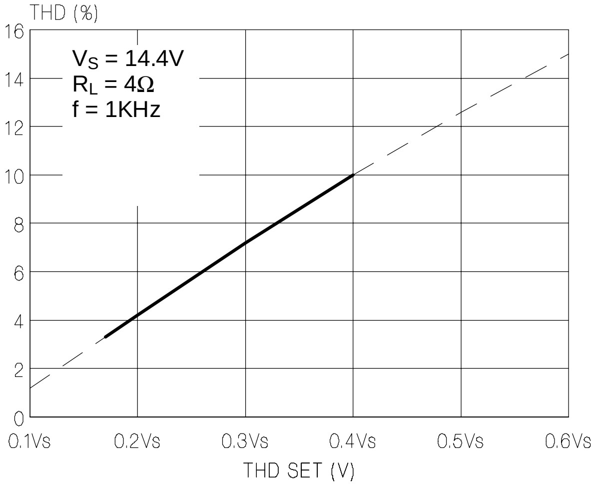


Figure 6: Quiescent Current vs. Supply Voltage

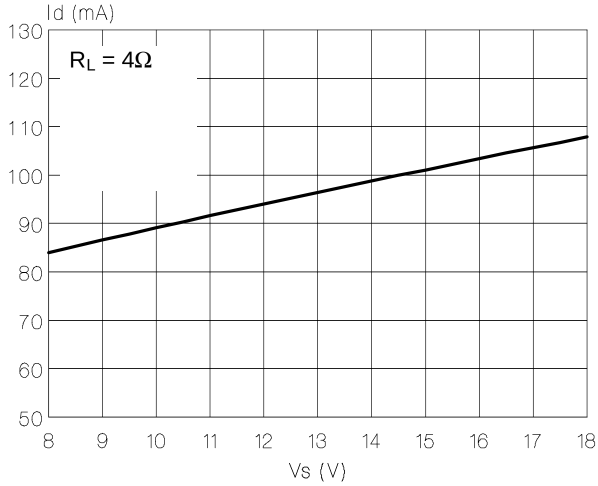


Figure 7: Ouput Power vs. Supply Voltage

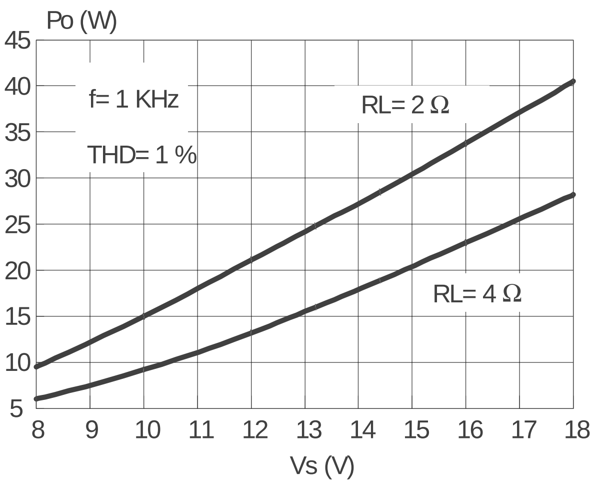


Figure 8: Ouput Power vs. Supply Voltage

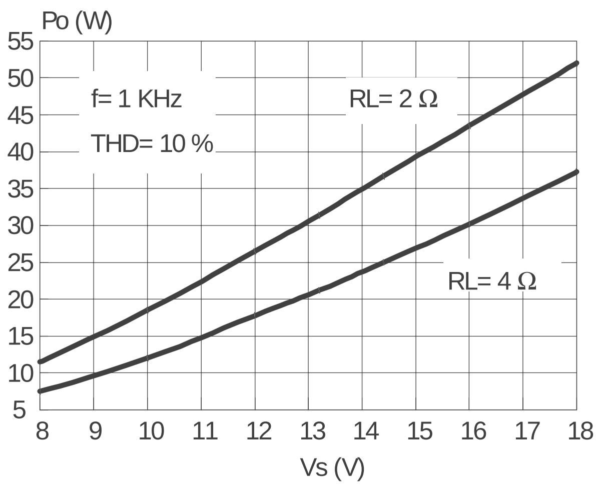


Figure 9: EIAJ Power vs. Supply Voltage

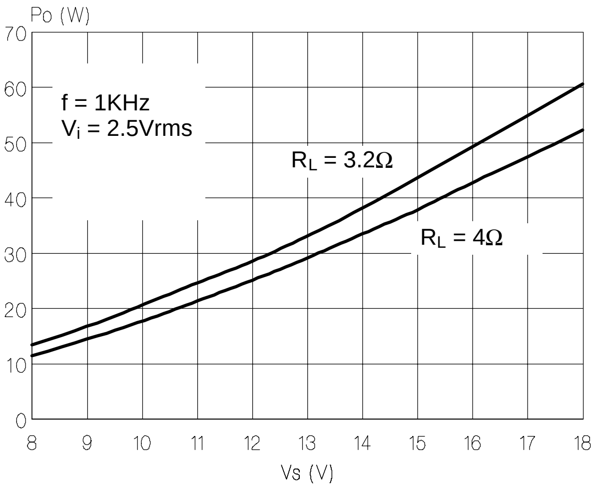


Figure 10: THD vs. Frequency

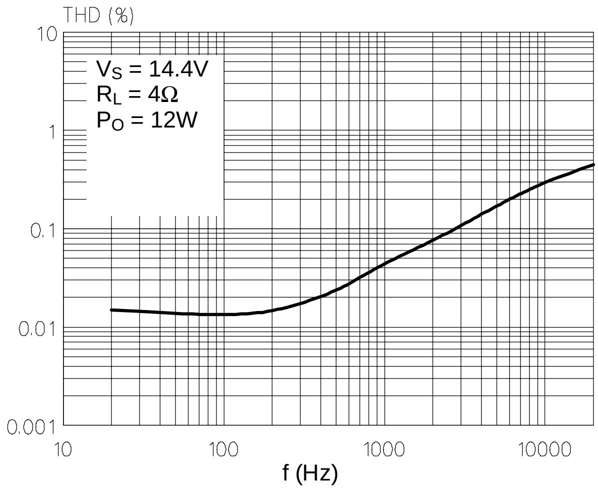


Figure 11: THD vs. Output Power (R_L = 4Ω)

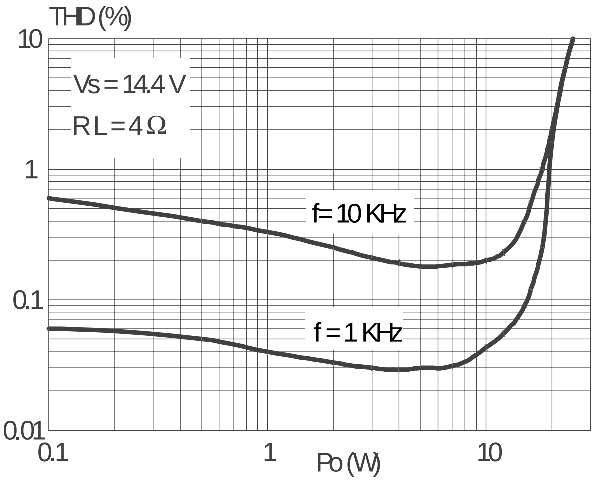


Figure 12: THD vs. Output Power (R_L = 24Ω)

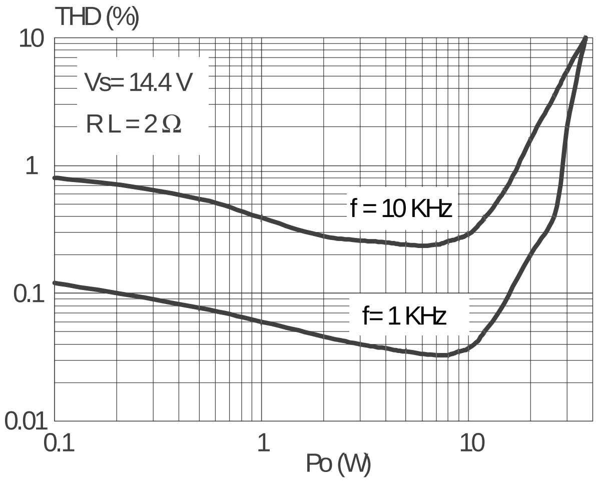


Figure 13: Dissipated Power & Efficiency vs. Output Power

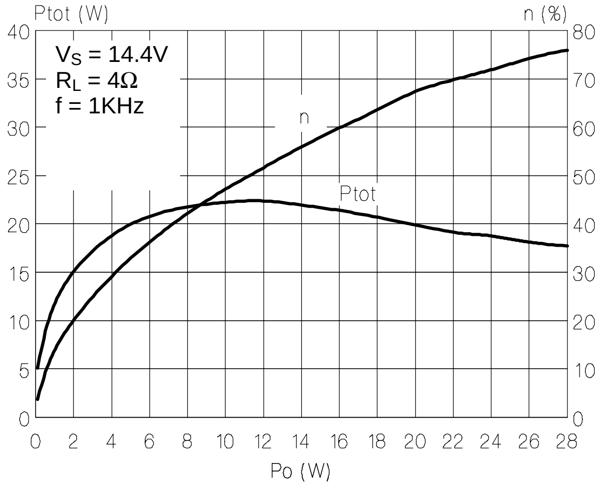


Figure 14: SVR vs. Frequency

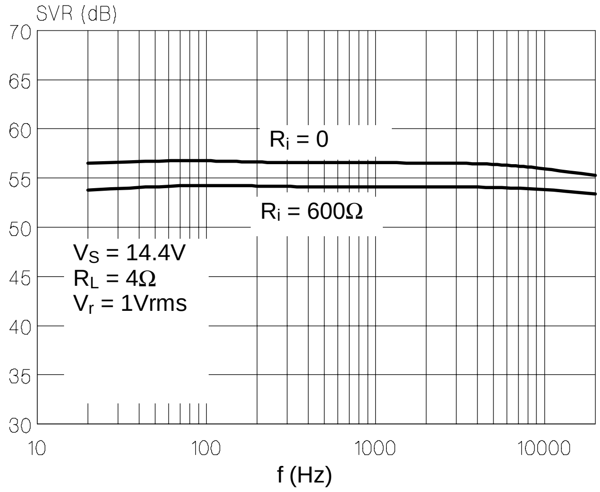


Figure 15: CMRR vs. Frequency

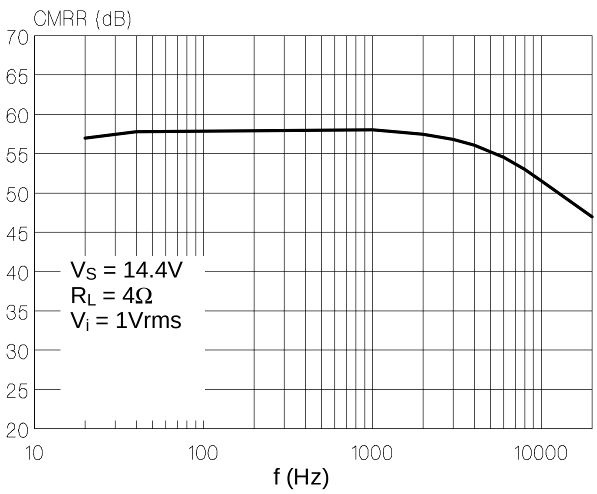
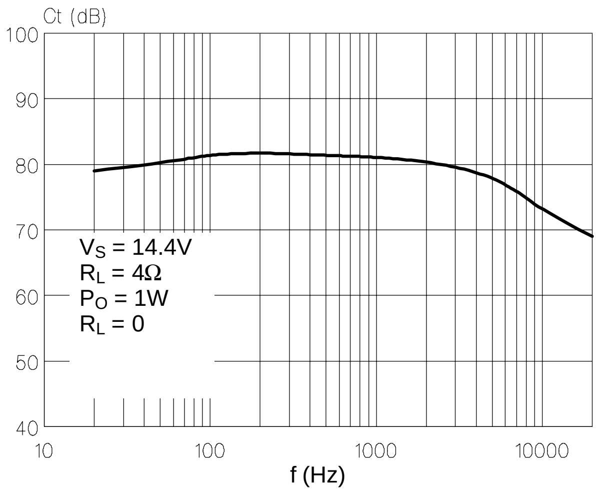
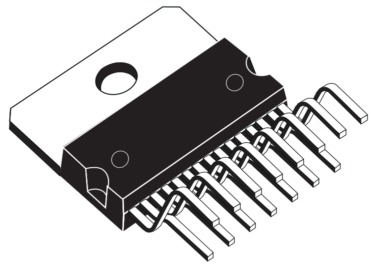


Figure 16: Crosstalk vs. Frequency



DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.02	1.27	1.52	0.040	0.050	0.060
G1	17.53	17.78	18.03	0.690	0.700	0.710
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.870	0.886
L2	17.65		18.1	0.695		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		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.63	5.08	5.53	0.182	0.200	0.218
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152

OUTLINE AND MECHANICAL DATA



Multiwatt15 V