TDA7376PD

2 X 35W POWER AMPLIFIER FOR CAR RADIO

■ HIGH OUTPUT POWER CAPABILITY
2 x 40W max./4Ω
2 x 35W/4Ω EIAJ
2 x 25W/4Ω @14.4V, 1KHz, 10%
2 x 25W/2Ω @14.4V, 1KHz, 10%
■ 2Ω DRIVING
■ DIFFERENTIAL INPUTS
■ MINIMUM EXTERNAL COMPONENTS COUNT
■ INTERNALLY FIXED GAIN (26dB)
■ MUTE FUNCTION (CMOS COMPATIBLE)
■ AUTOMUTE AT MINIMUM SUPPLY VOLTAGE DETECTION
■ STAND-BY FUNCTION
■ NO AUDIBLE POP DURING MUTE AND SY-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

PowerSO36 (Slug up)
ORDERING NUMBER: TDA7376PD
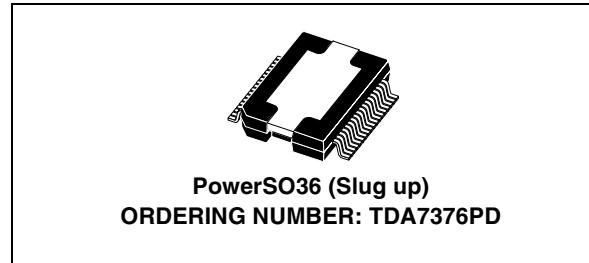
SOFT THERMAL LIMITER
■ LOAD DUMP VOLTAGE
■ FORTUITOUS OPEN GROUND
■ LOUDSPEAKER DC CURRENT
■ ESD

DESCRIPTION

The TDA7376PD is a new technology dual bridge Audio Amplifier in PowerSO36 package designed for car radio applications. Thanks to the fully complementary PNP/NPN output stage configuration the TDA7376PD delivers a rail-to-rail voltage swing with no need of bootstrap capacitors.

BLOCK DIAGRAM
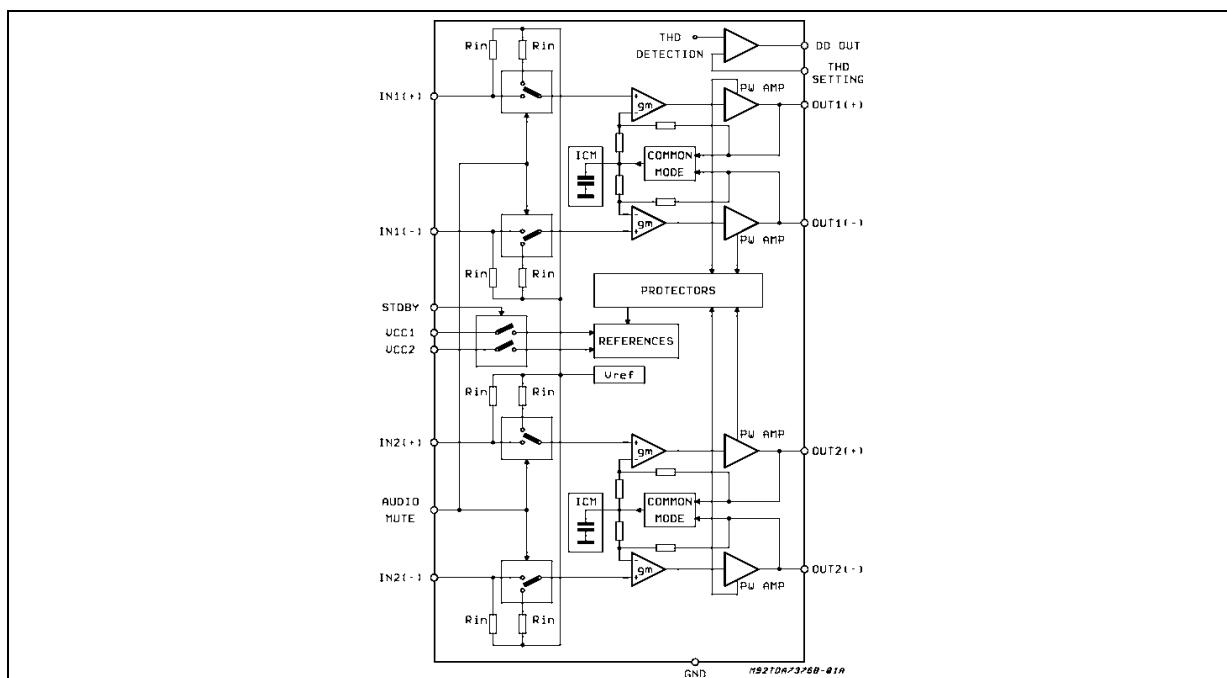
DESCRIPTION (Continued)

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 de-biases 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 (Top view)

NC	36		1	**TAB**	
PWGND	35		2	PWGND	
PWGND	34		3	PWGND	
NC	33		4	NC	
OUT2+	32		5	OUT1+	
OUT2+	31		6	OUT1+	
NC	30		7	NC	
OUT2-	29		8	OUT1-	
OUT2-	28		9	OUT1-	
VCC	27		10	VCC	
VCC	26		11	VCC	
IN2+	25		12	IN1+	
IN2-	24		13	IN1-	
NC	23		14	NC	
NC	22		15	NC	
CD-OUT	21		16	MUTE	
THDSET	20		17	ST-BY	
NC	19		18	SGND	

D02AU1348
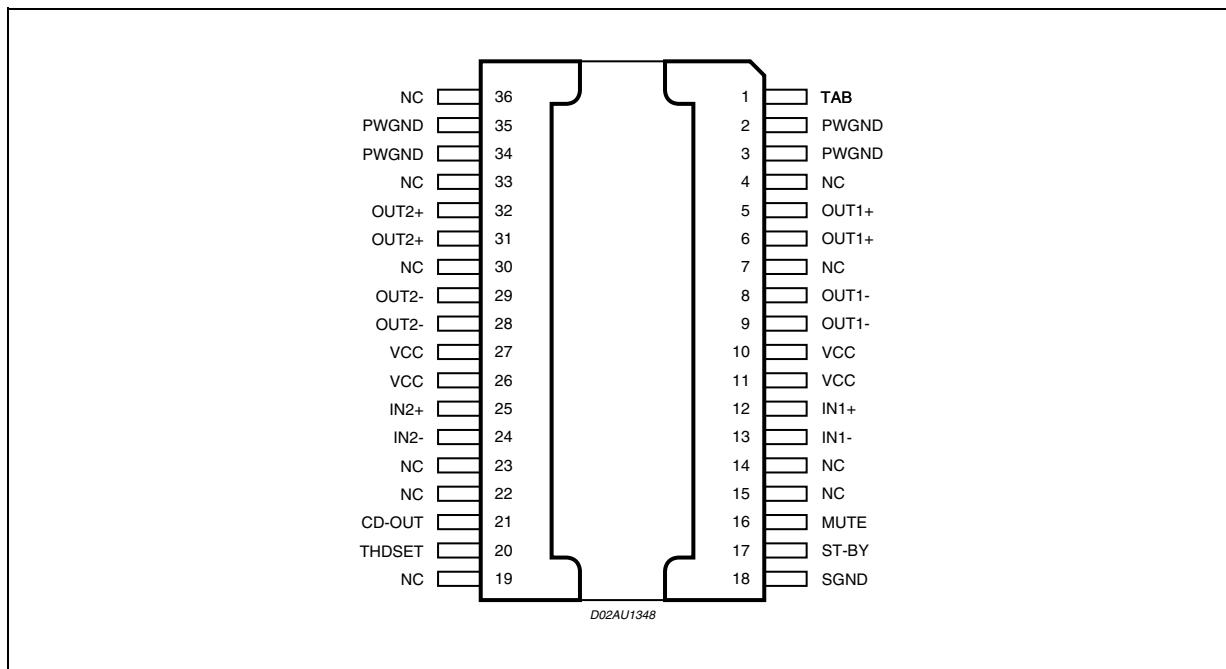
ABSOLUTE MAXIMUM RATINGS

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 (not repetitive t = 100µs)	8	A
	Output Peak Current (repetitive f > 10Hz)	6	A
P_{tot}	Power Dissipation T_{case} = 85°C	36	W
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	°C

THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ j-case}$	Thermal Resistance Junction to case	Max	2	°C/W

**Figure 1. Differential Inputs Test and Application Circuit**
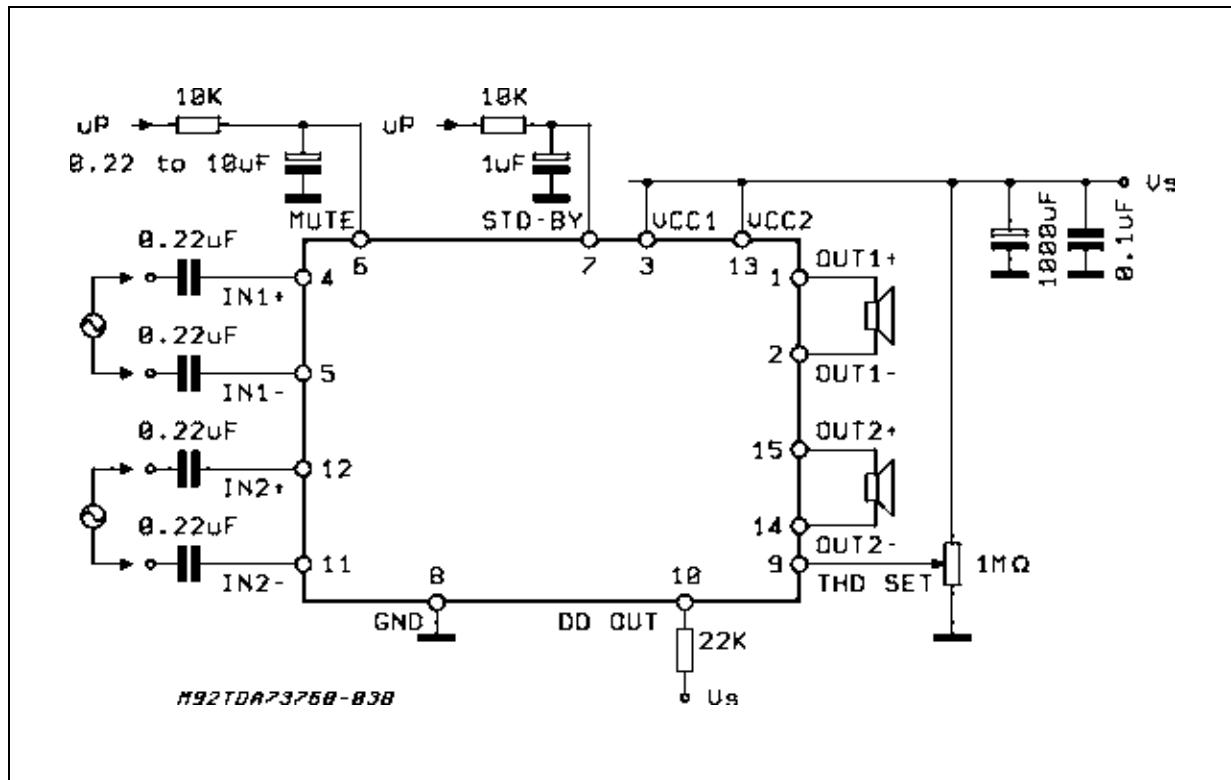
**Figure 2. Single Ended Inputs Test and Application Circuit**
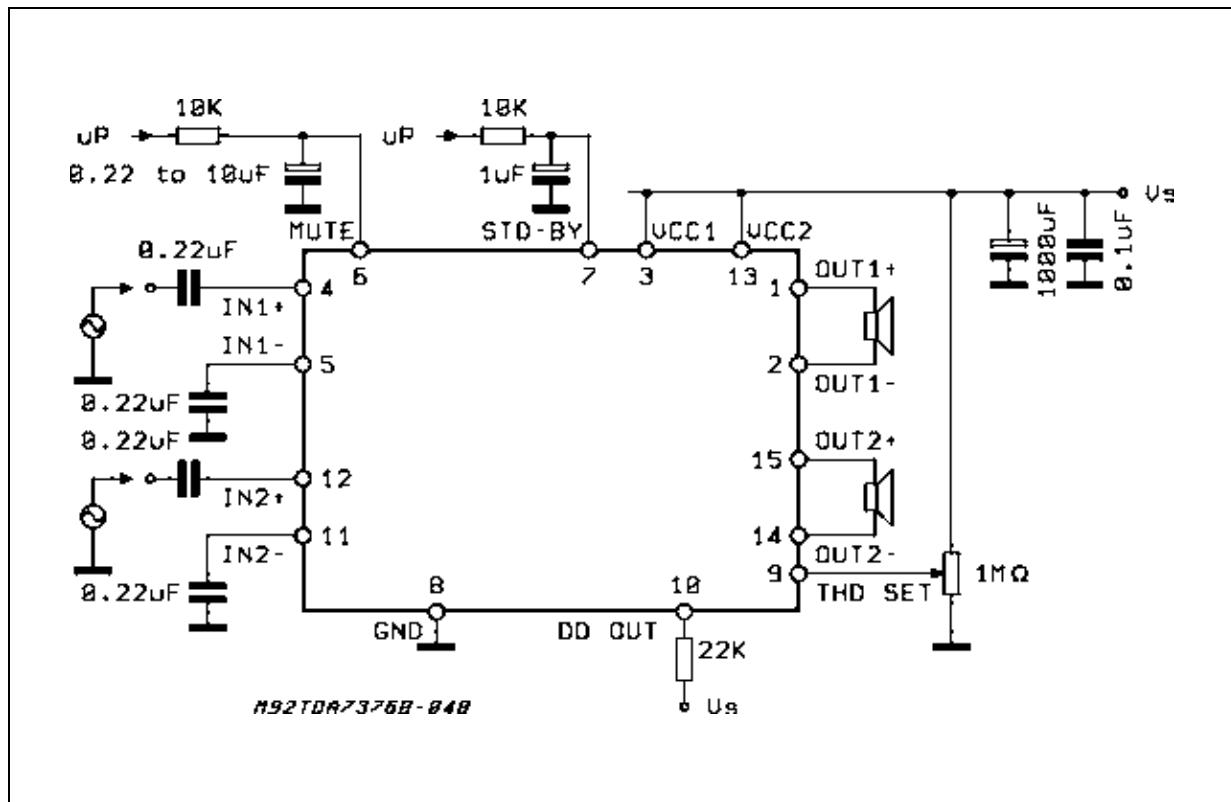
Figure 3. Application Board Reference Circuit
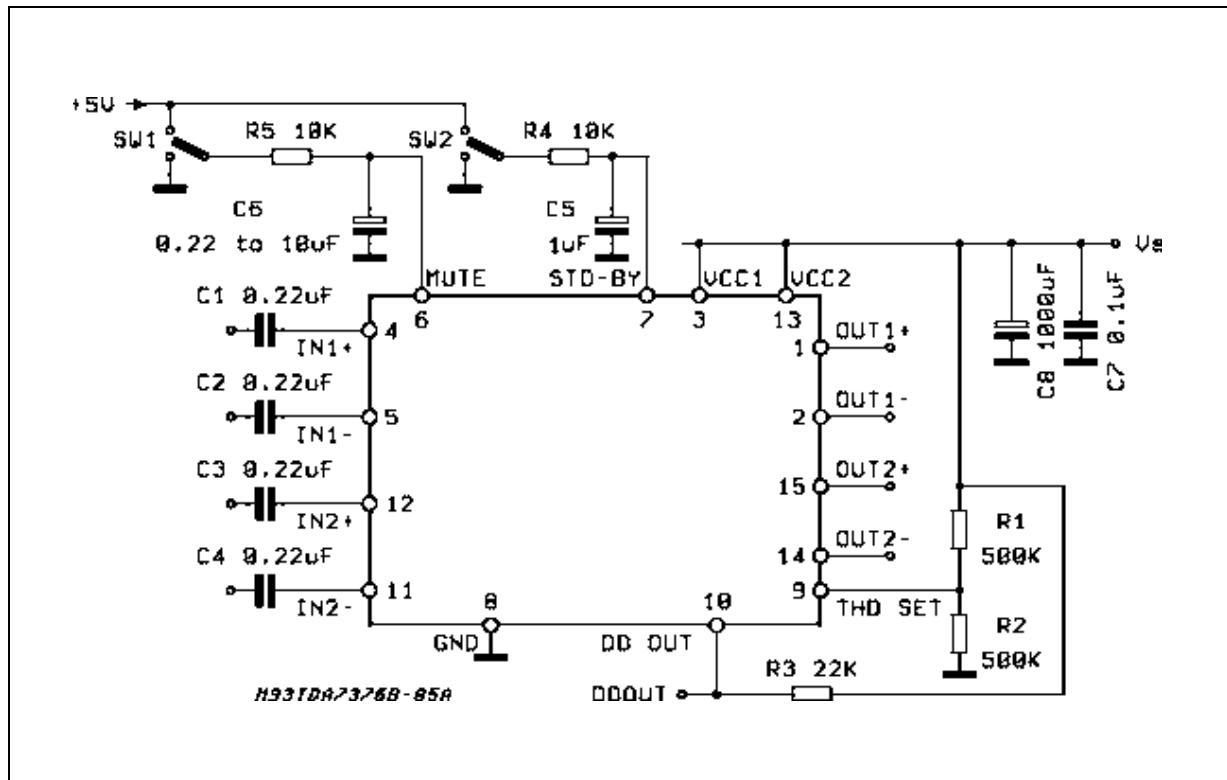
ELECTRICAL CHARACTERISTCS (Refer to the test circuits figgs 1 and 2, V_S = 14.4V; R_L = 4Ω; f = 1KHz; T_{amb} = 25°C, unless otherwise specified).

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage Range		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 (*)		36	40		W
$P_{O\ EIAJ}$	EIAJ Outout 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		% %
C_T	Cross Talk	f = 1KHz; R_g f = 10KHz; R_g		80 70		dB dB
R_{IN}	Input Impedance	differential input Single Ended input	45 40			KΩ KΩ
G_V	Voltage Gain	differential input	25	26	27	dB
		Single Ended input	25	26	27	dB
ΔG_V	Channel Gain Balance				1	dB
E_{IN}	Input Noise Voltage	R_g = 600Ω; "A" weighted R_g = 600Ω; 22Hz to 33KHz		3 4	6	μV μV
SVR	Supply Voltage Rejection	f = 100Hz; V_r = 1Vrms; R_g = 0; f = 10Hz; V_r = 1Vrms; R_g = 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; $P_{O\ ref}$ = 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	V_{SB} = 0V			20	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	V_6 = 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 TDA7376PD 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. 4 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 4. Clip Detector Threshold vs. THD set. Voltage.**

THD (%)

$V_S = 14.4V$
$R_L = 4\ \Omega$
$f = 1KHz$

THD SET (V)
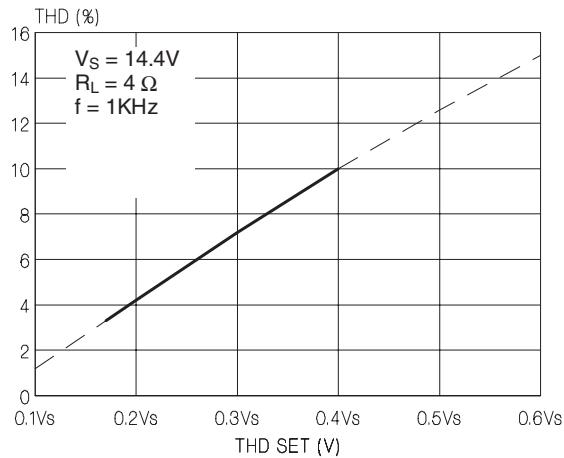
Figure 5. Quiescent Current vs. Supply Voltage
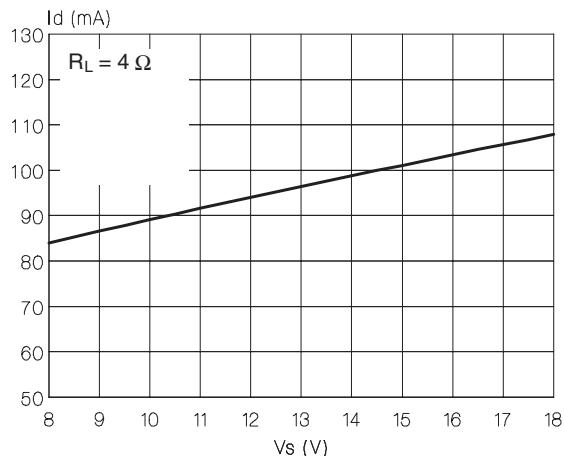
Id (mA)

$R_L = 4\ \Omega$

Vs (V)

Figure 6. Ouput Power vs. Supply Voltage

Po (W)

$f = 1\ KHz$

THD = 1 %

RL = 2 Ω

RL = 4 Ω

Vs (V)

Figure 7. Ouput Power vs. Supply Voltage

Po (W)

f = 1 KHz

THD = 10 %

RL = 2 Ω

RL = 4 Ω

Vs (V)
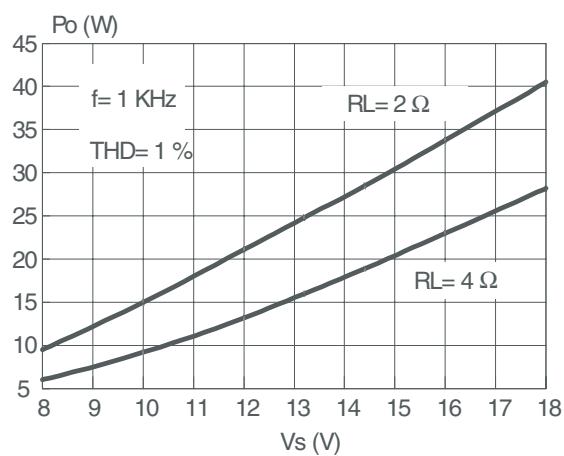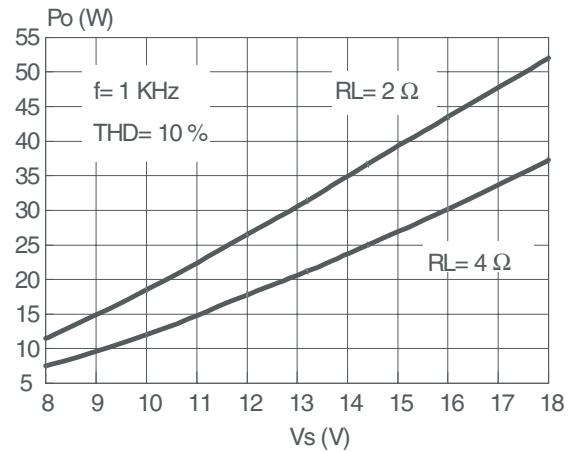
Figure 8. EIAJ Power vs. Supply Voltage

Po (W)

$f = 1KHz$
$V_i = 2.5Vrms$

$R_L = 3.2\ \Omega$

$R_L = 4\ \Omega$

Vs (V)
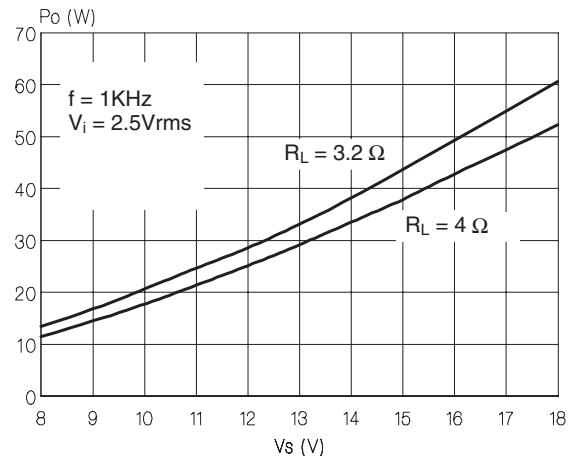
Figure 9. THD vs. Frequency

THD (%)

$V_S = 14.4V$
$R_L = 4\ \Omega$
$P_O = 12W$

f (Hz)
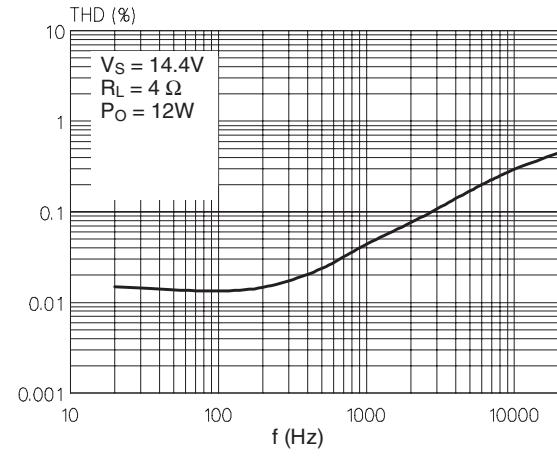
Figure 10. THD vs. Output Power (R_L = 4Ω)
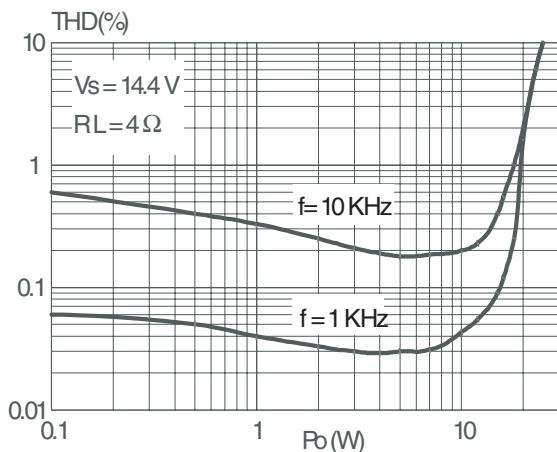
Figure 11. THD vs. Output Power (R_L = 24Ω)
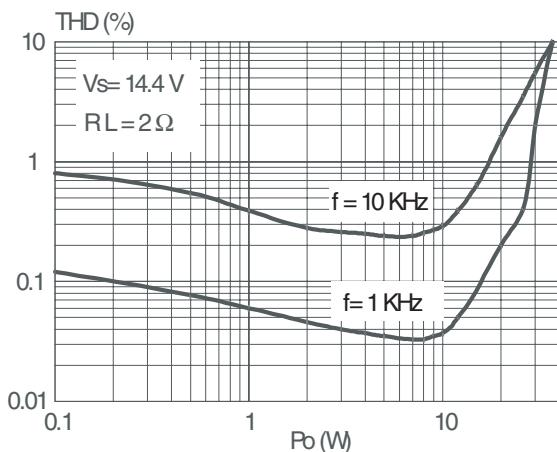
**Figure 12. Dissipated Power & Efficiency vs. Output Power**
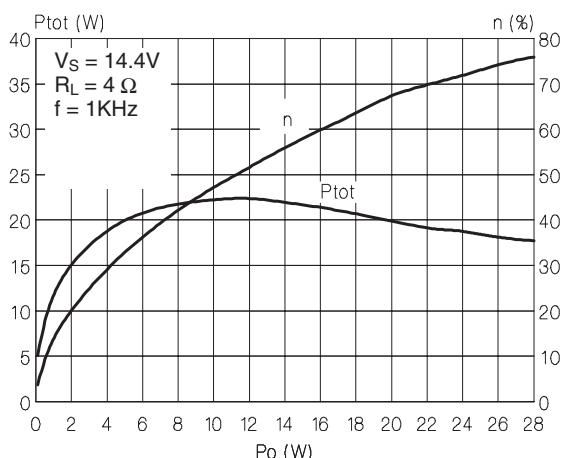
Figure 13. SVR vs. Frequency
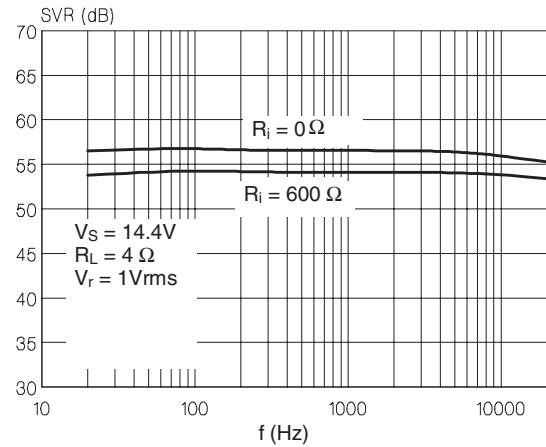

Figure 14. CMRR vs. Frequency
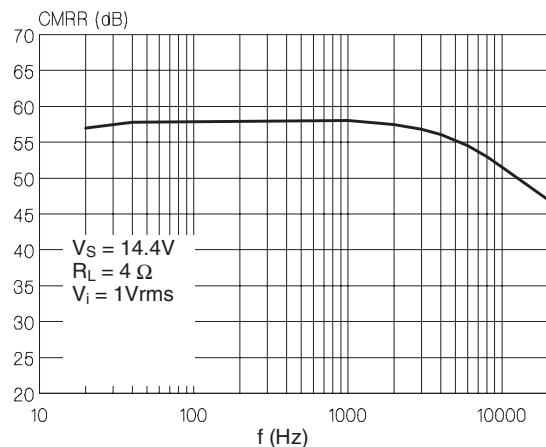
Figure 15. Crosstalk vs. Frequency
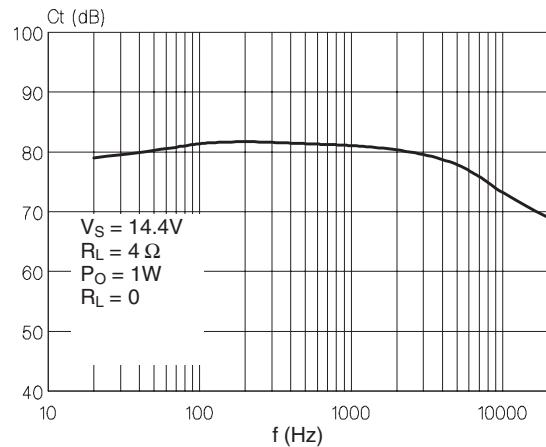
| DIM.	mm			inch		
	MIN.	**TYP.**	**MAX.**	**MIN.**	**TYP.**	**MAX.**
A	3.25		3.43	0.128		0.135
A2	3.1		3.2	0.122		0.126
A4	0.8		1	0.031		0.039
A5		0.2			0.008	
a1	0.030		-0.040	0.0011		-0.0015
b	0.22		0.38	0.008		0.015
c	0.23		0.32	0.009		0.012
D	15.8		16	0.622		0.630
D1	9.4		9.8	0.37		0.38
D2		1			0.039	
E	13.9		14.5	0.547		0.57
E1	10.9		11.1	0.429		0.437
E2			2.9			0.114
E3	5.8		6.2	0.228		0.244
E4	2.9		3.2	0.114		1.259
e		0.65			0.026	
e3		11.05			0.435	
G	0		0.075	0		0.003
H	15.5		15.9	0.61		0.625
h			1.1			0.043
L	0.8		1.1	0.031		0.043
N	10° (max)					
s	8° (max)					

(1) "D and E1" do not include mold flash or protusions.
Mold flash or protusions shall not exceed 0.15mm (0.006")
(2) No intrusion allowed inwards the leads.

OUTLINE AND MECHANICAL DATA

PowerSO36 (SLUG UP)

File name= 7183931.dwg

7183931 C

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