



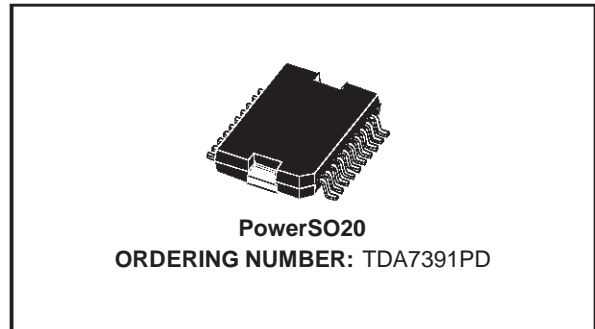
## 32W BRIDGE CAR RADIO AMPLIFIER

PRODUCT PREVIEW

- HIGH POWER CAPABILITY:  
40W/3.2Ω EIAJ  
32W/3.2Ω @  $V_s = 14.4V, f = 1KHz, d = 10\%$   
26W/4Ω @  $V_s = 14.4V, f = 1KHz, d = 10\%$
- DIFFERENTIAL INPUTS (EITHER SINGLE ENDED OR DIFFERENTIAL INPUT SIGNAL ARE ACCEPTED)
- MINIMUM EXTERNAL COMPONENT COUNT:
  - NO BOOTSTRAP CAPACITORS
  - NO BOUCHEROT CELLS
  - INTERNALLY FIXED GAIN (30dB)
  - NO SVR CAPACITOR
- ST.-BY FUNCTION (CMOS COMPATIBLE)
- PROGRAMMABLE TURN-ON/OFF DELAY
- NO AUDIBLE POP DURING MUTE AND ST-BY OPERATIONS

### PROTECTIONS:

- SHORT CIRCUIT (TO GND, TO  $V_s$ , ACROSS THE LOAD)
- VERY INDUCTIVE LOADS
- CHIP OVERTEMPERATURE
- LOAD DUMP
- OPEN GND
- ESD



### DESCRIPTION

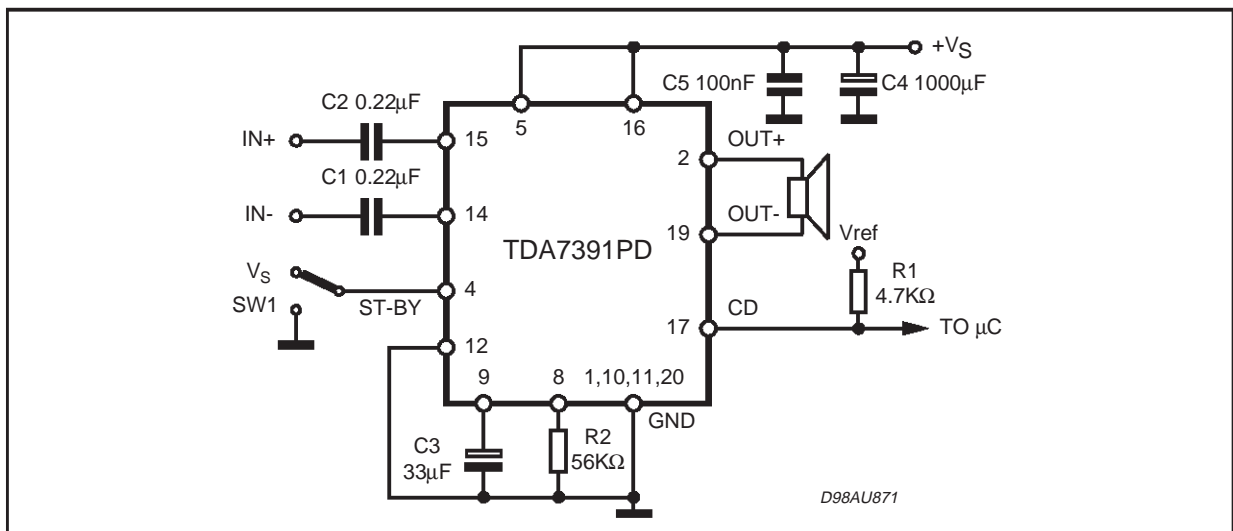
The TDA7391PD is a BRIDGE class AB audio power amplifier specially intended for car radio High Power applications.

The high power capability together with the possibility to operate either in DIFFERENTIAL INPUT MODE or SINGLE ENDED INPUT MODE makes it suitable for boosters and high end car radio equipments.

The exclusive fully complementary output stage and the internal fixed gain configuration drop the external component count.

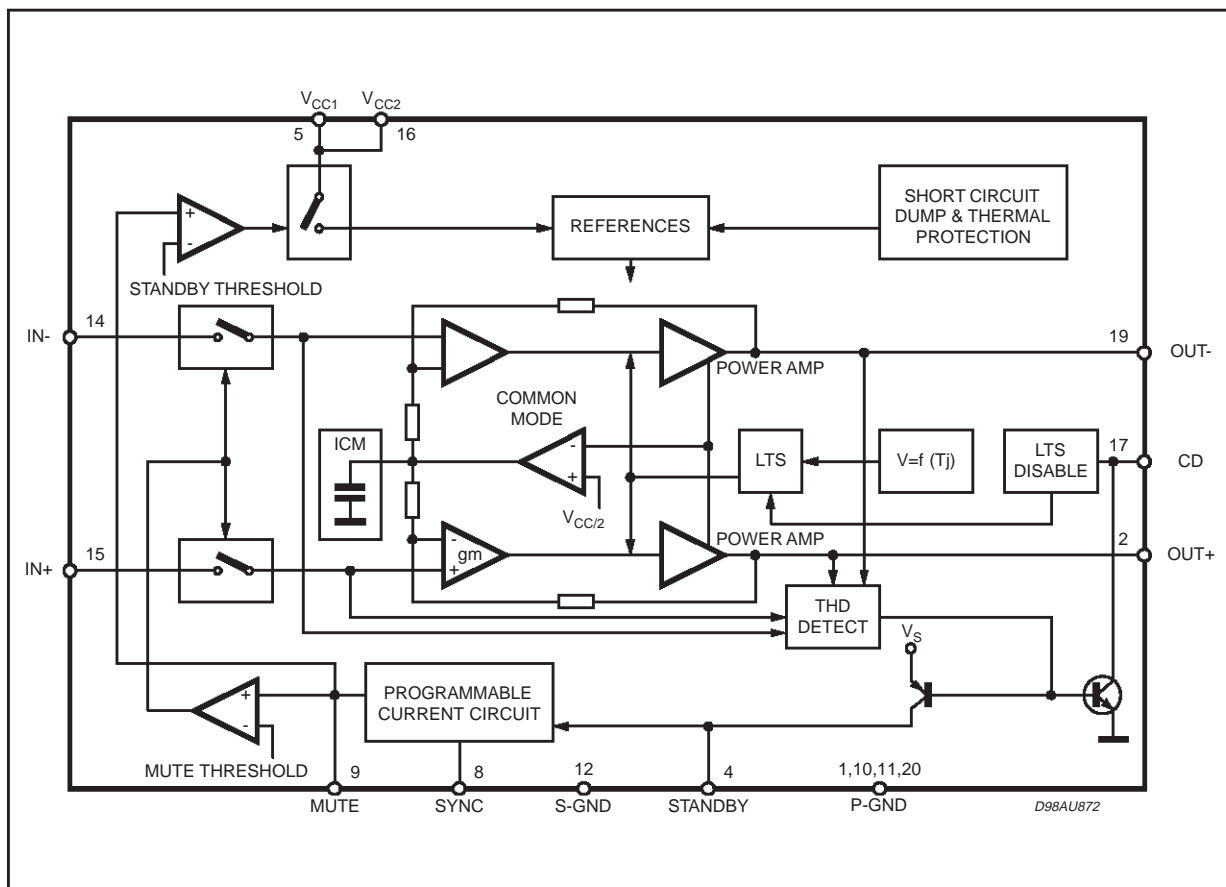
The on board clipping detector allows easy implementation of gain compression systems.

Figure 1: Test And Application Circuit

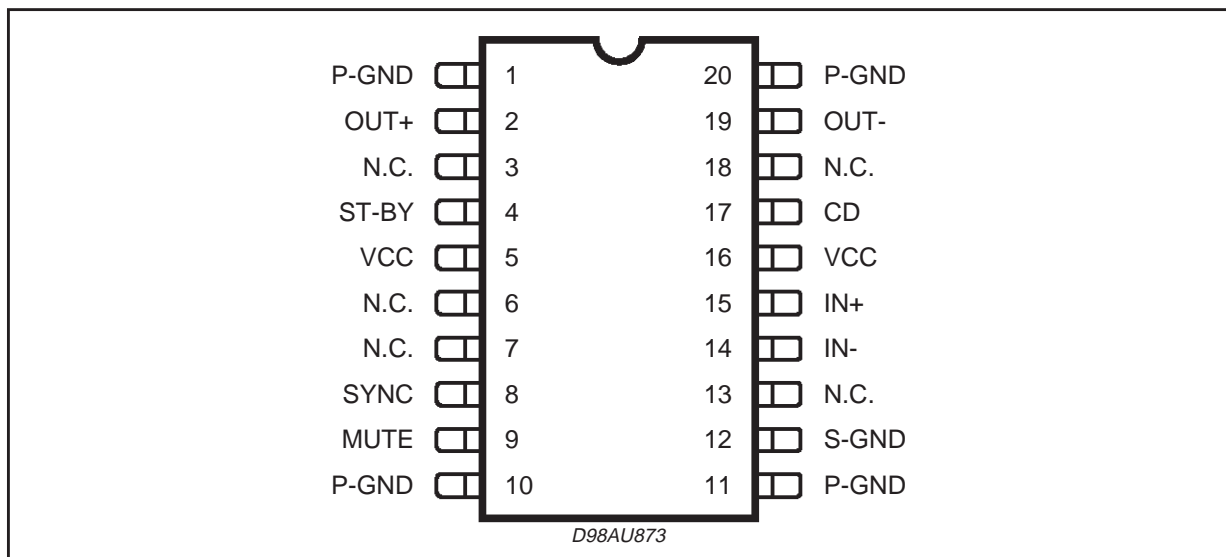


# TDA7391PD

Figure 2: Block Diagram



## PIN CONNECTION (Top view)



## THERMAL DATA

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

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_S$	DC Supply Voltage	28	V
$V_{OP}$	Operating Supply Voltage	18	V
$V_{PEAK}$	Peak Supply Voltage (t = 50ms)	50	V
$I_O$	Output Peak Current repetitive (f > 10Hz)	4.5	A
	Output Peak Current non repetitive	6	A
$P_{tot}$	Power Dissipation ( $T_{CASE} = 85^\circ\text{C}$ )	32	W
$T_{stg}, T_j$	Storage and Junction-Case Temperature	-40 to 150	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ( $V_S = 14.4\text{V}$ ;  $R_L = 4\Omega$ ,  $f = 1\text{KHz}$ ,  $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified)

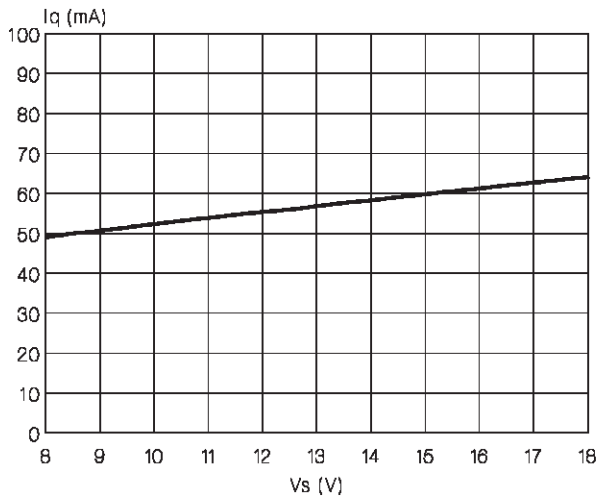
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_S$	Supply Voltage Range		8		18	V
$I_q$	Total Quiescent Current			60	150	mA
$V_{OS}$	Output Offset Voltage				120	mV
$I_{SB}$	ST-BY Current	$V_{ST-BY} = 1.5\text{V}$			100	$\mu\text{A}$
$I_{SBin}$	ST-BY Input Bias Current	$V_{ST-BY} = 5\text{V}$			10	$\mu\text{A}$
$V_{SBon}$	ST-BY On Threshold Voltage				1.5	V
$V_{SBoff}$	ST-BY Off threshold Voltage		3.5			V
$ATT_{ST-BY}$	ST-BY Attenuation			90		dB
$I_{M in}$	Mute Input Bias Current	( $V_{MUTE} = 5\text{V}$ )			10	$\mu\text{A}$
$A_M$	Mute Attenuation			90		dB
$P_O$	RMS Output Power	d = 10% d = 1% d = 10%; $R_L = 3.2\Omega$	20	26 21 32		W W W
	EIAJ Output Power	$V_S = 13.7\text{V}$		40		W
d	Distortion	$P_O = 0.1$ to $15\text{W}$		0.06		%
				0.03		%
$G_V$	Voltage Gain		29.5	30	30.5	dB
$f_H$	High Frequency rolloff	$P_O = 1\text{W}$ ; -3dB	75			KHz
$R_{IN}$	Input Impedance	Differential	36	60		$\text{K}\Omega$
		Single Ended	30	55		$\text{K}\Omega$
$E_{IN}$	Input Noise Voltage	$R_g = 0\Omega$ ; f = 22Hz to 22KHz		4		mV
CMRR	Input Common Mode Rejection	f = 1KHz; $V_{IN} = 1\text{Vrms}$		65		dB
SVR	Supply Voltage Rejection	$R_g = 0\Omega$ ; $V_r = 1\text{Vrms}$		60		dB
CDL	Clipping Detection Level		5	10	15	%
$T_{sd}$	Absolute Thermal Shutdown Junction Temperature			160		$^\circ\text{C}$

## TDA7391PD

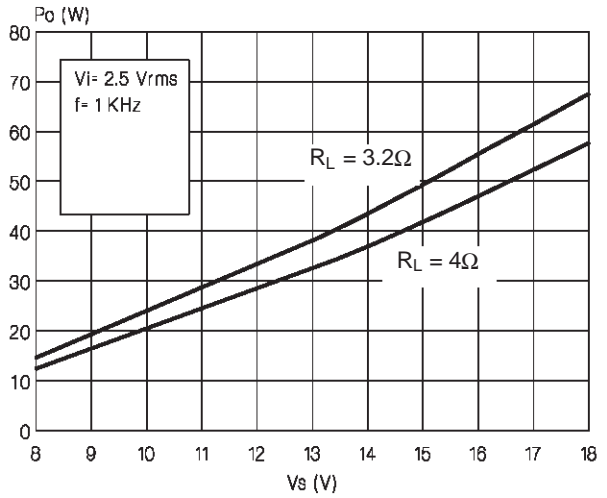
### FUNCTIONAL DESCRIPTION

Pin	Function	Description
14, 15	INPUTS	The input stage is a high impedance type also capable of operation in single ended mode with one input capacitively coupled to the signal GND. The impedance seen by the inverting and non inverting input pins must be matched.
5,16	+V <sub>S</sub>	Supply Voltage.
17	CD	The TDA7391PD is equipped with a diagnostic circuitry able to detect the clipping in the Output Signal (distortion = 10%). The CD pin (open collector) gives out low level signal during clipping.
2,19	OUTPUTS	The output stage is a bridge type able to drive loads as low as 3.2Ω. It consists of two class AB fully complementary PNP/NPN stages fully protected. A rail to rail output voltage swing is achieved without need of bootstrap capacitors. No external compensation is necessary.
1,10, 11,20	P-GND	Power Ground.
12	S-GND	Signal Ground.
4	STAND-BY	The device features a ST-BY function which shuts down all the internal bias supplies when the ST-BY pin is low. In ST-BY mode the amplifier sinks a small current (in the range of few μA). When the ST-BY pin is high the IC becomes fully operational.
8	SYNC	A resistor (R <sub>2</sub> ) has to be connect between pin 8 and GND in order to program the current that flows in the C <sub>3</sub> capacitor (pin 9). The values of C <sub>3</sub> and R <sub>2</sub> determine the time required to bias the amplifier.
9	MUTE	The pin will have a capacitor (C <sub>3</sub> ) tied to GND to set the MUTE/STAND-BY time. An automatic Mute during turn on/off is provided to prevent noisy transients.

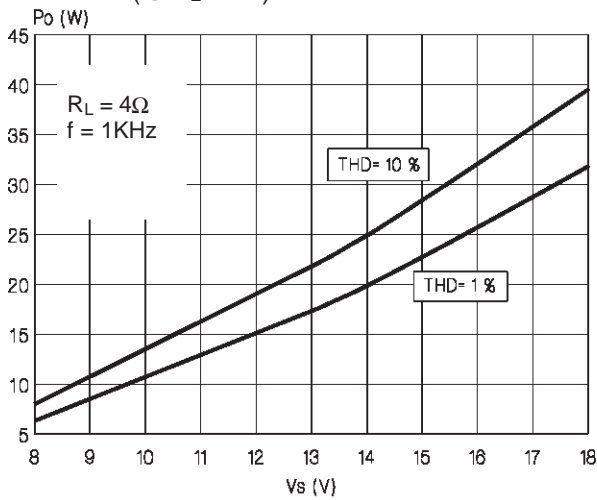
**Figure 2: Quiescent Current vs Supply Voltage**



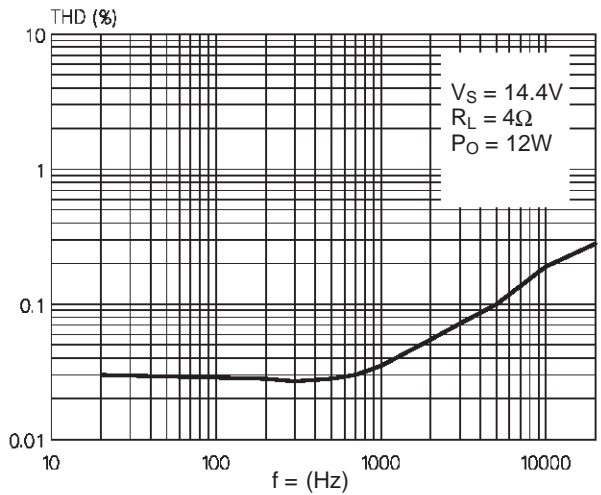
**Figure 3: EIAJ power vs Supply Voltage**



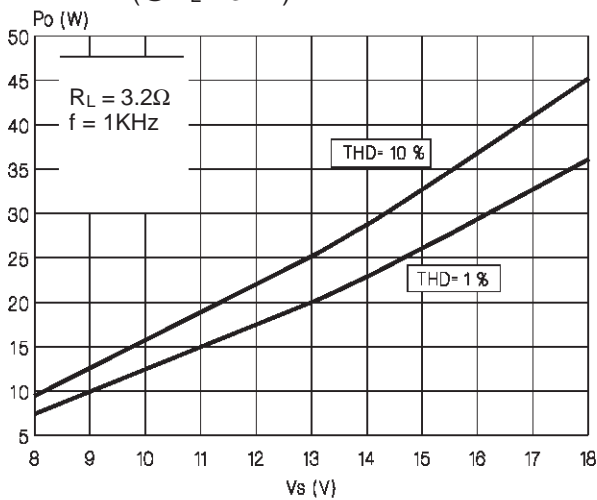
**Figure 4: Output Power vs Supply Voltage (@  $R_L = 4\Omega$ )**



**Figure 5: Distortion vs Frequency (@  $R_L = 4\Omega$ )**



**Figure 6: Output Power vs Supply Voltage (@  $R_L = 3.2\Omega$ )**



**Figure 7: Distortion vs Frequency ( $R_L = 4\Omega$ )**

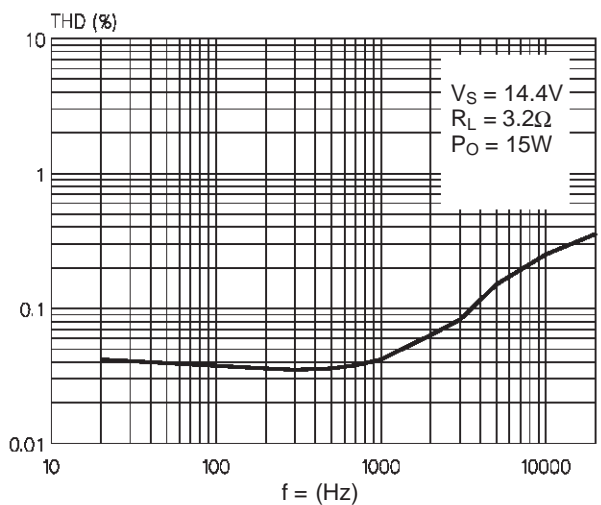


Figure 8: Supply Voltage Rejection vs Frequency

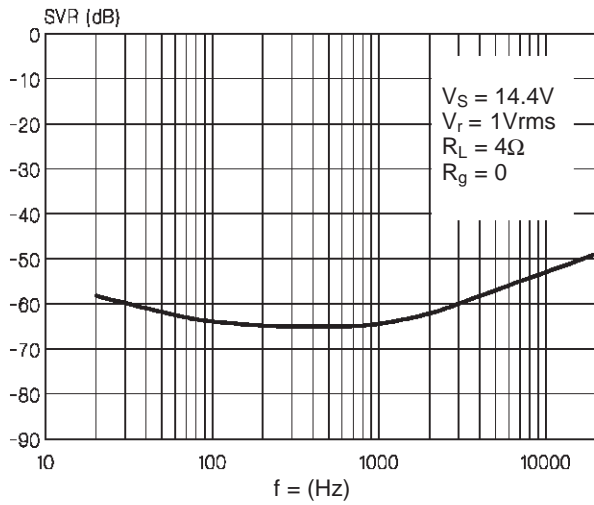


Figure 9: Common Mode Rejection vs. Frequency

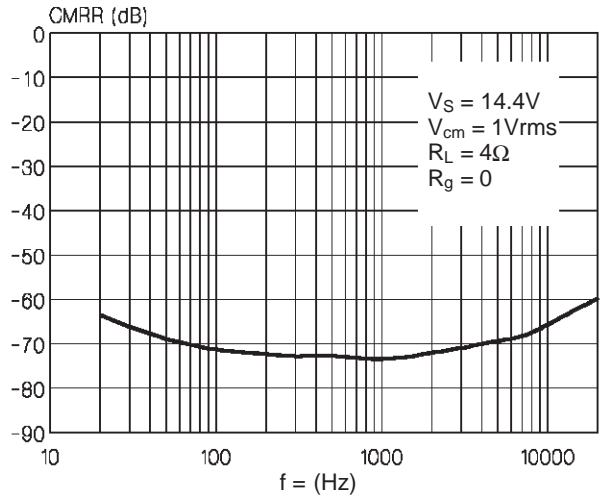


Figure 10: Total Power Dissipation & Efficiency vs. Output Power (@  $R_L = 4\Omega$ )

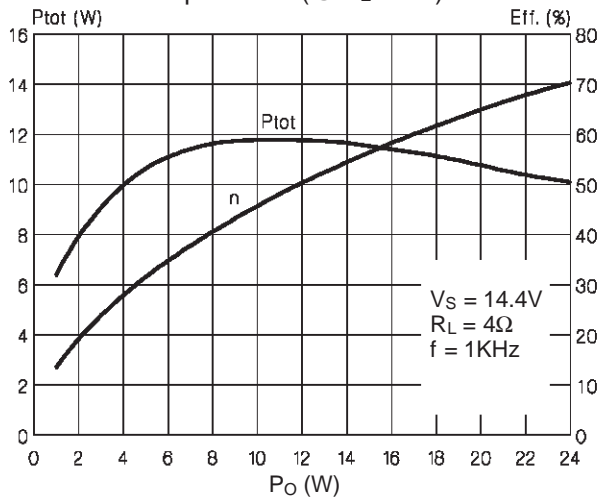
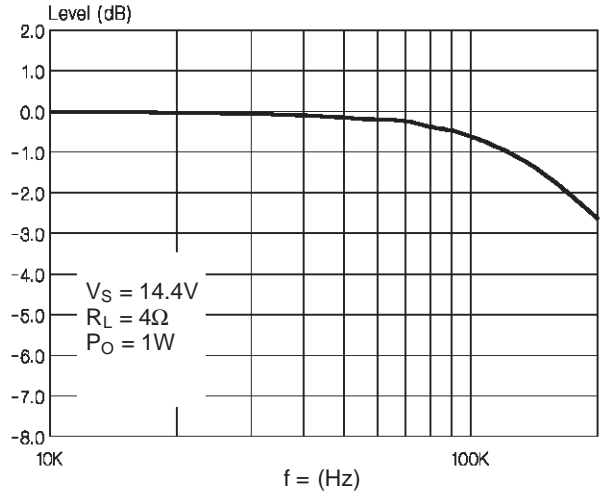


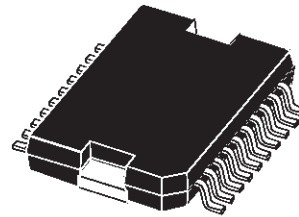
Figure 11: Power Bandwidth



DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.6			0.142
a1	0.1		0.3	0.004		0.012
a2			3.3			0.130
a3	0		0.1	0.000		0.004
b	0.4		0.53	0.016		0.021
c	0.23		0.32	0.009		0.013
D (1)	15.8		16	0.622		0.630
D1	9.4		9.8	0.370		0.386
E	13.9		14.5	0.547		0.570
e		1.27			0.050	
e3		11.43			0.450	
E1 (1)	10.9		11.1	0.429		0.437
E2			2.9			0.114
E3	5.8		6.2	0.228		0.244
G	0		0.1	0.000		0.004
H	15.5		15.9	0.610		0.626
h			1.1			0.043
L	0.8		1.1	0.031		0.043
N	10° (max.)					
S	8° (max.)					
T		10			0.394	

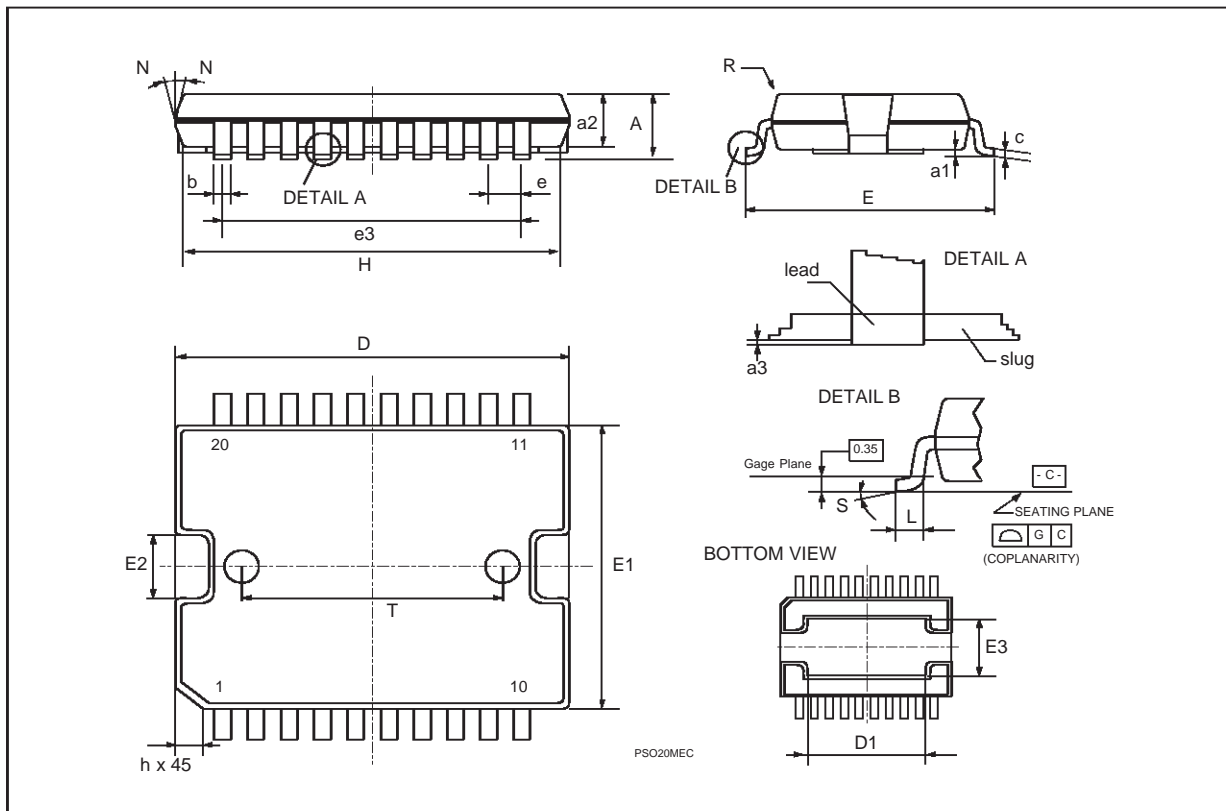
(1) "D and F" do not include mold flash or protrusions.  
 - Mold flash or protrusions shall not exceed 0.15 mm (0.006").  
 - Critical dimensions: "E", "G" and "a3"

**OUTLINE AND MECHANICAL DATA**



**JEDEC MO-166**

**PowerSO20**



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