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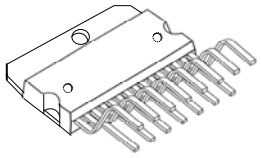
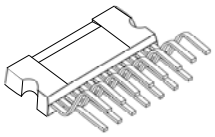
TDA7377

LINEAR INTEGRATED CIRCUIT

2 x 30W DUAL/QUAD POWER AMPLIFIER FOR CAR RADIO



HZIP-15A



HZIP-15D

■ DESCRIPTION

The UTC **TDA7377** is a class AB car radio amplifier for car radio, it can work either in dual bridge or quad single ended configuration. The exclusive fully complementary structure of the output stage and the internally fixed gain guarantees the highest possible power performances with few external components. The on-board clip detector simplifies gain compression operation. The fault diagnostics makes it possible to detect mistakes during car radio set assembly and wiring in the car.

■ FEATURES

* High Output Power@V_{CC}=14.4V, f=1KHz，RL=4Ω:
  – 2 x 35W Max.
  – 2 x 20W@THD= 10%
  – 4 x 6 W @10%
  – 4 x 10W / 2Ω@10%
  – 2 x 30W / EIAJ@ V_{CC} =13.7V，RL=4Ω
* CMOS Compatible Stand-by Function (Low I_{CC})
* No Audible pop During st-by Operations
* Internally Fixed Gain (26dB BTL and 20dB single ended)
* No Bootstrap Capacitors and boucherot Cells
* Diagnostics Facility on pin10 when output Clipping, shorted to Vcc or GND, thermal shutdown and soft short at turn on.
* Rail to rail output swing
* Absolute Stability Without Any External Compensation.

■ PROTECTIONS

* Load Dump Voltages surge
* Reversed Battery
* Output DC Short Circuit protecttion with Low current when shorted to GND or V_{CC}.
* Output AC short circuit protection: across the load
* Silent Turn On/Off
* thermal shutdown
* Load very Inductive speakers
* Fortuitous Open GND
* ESD

■ ORDERING INFORMATION

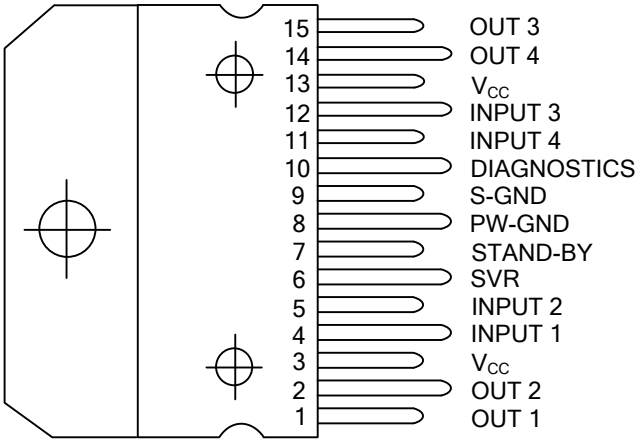
Ordering Number		Package	Packing
Lead Free	Halogen Free		
TDA7377L-J15-A-T	TDA7377G-J15-A-T	HZIP-15A	Tube
TDA7377L-J15-D-T	TDA7377G-J15-D-T	HZIP-15D	Tube

TDA7377L-J15-A-T
(1) Packing Type
(2) Package Type
(3) Lead Free

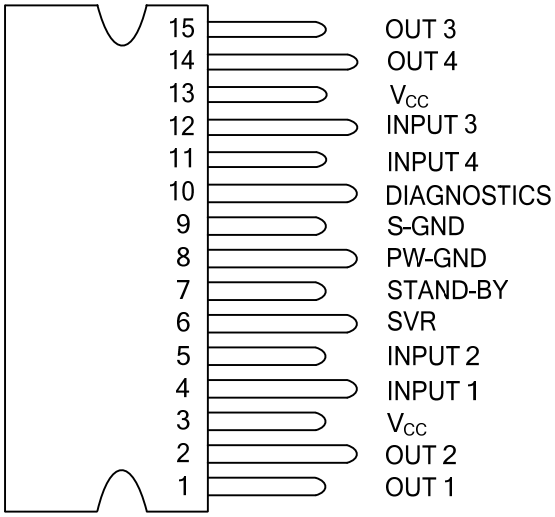
(1) T: Tube
(2) J15-A:HZIP-15A, J15-D: HZIP-15D
(3) L: Lead Free, G: Halogen Free

■ PIN CONNECTION

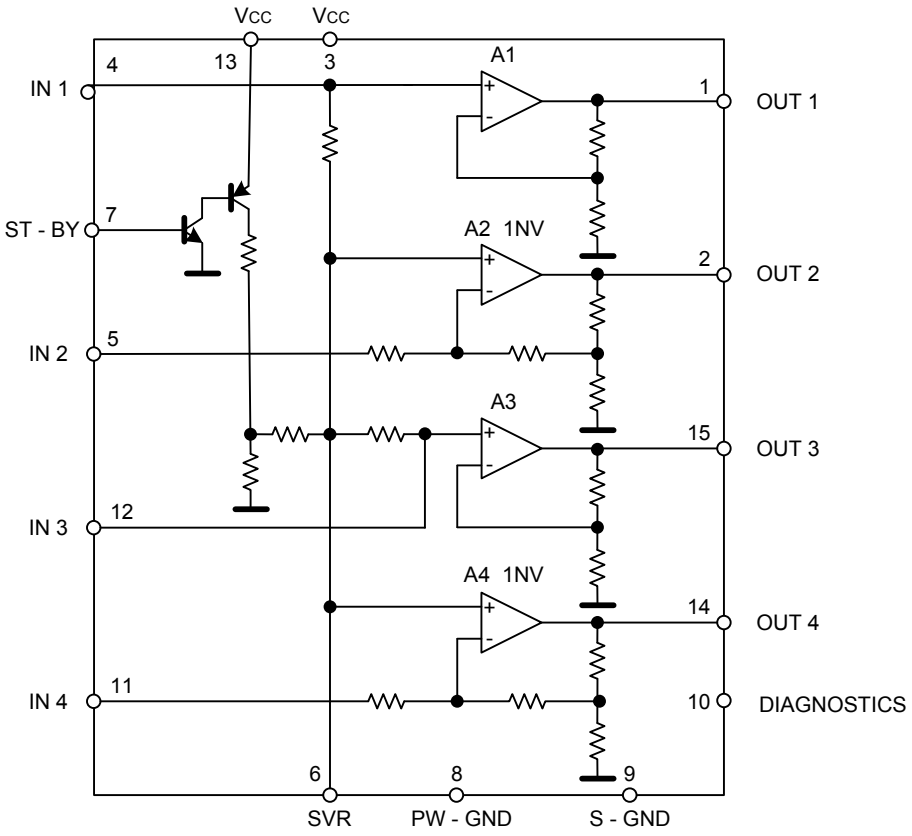
HZIP-15A



HZIP-15D



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Operating Supply Voltage		V_{OP}	18	V
DC Supply Voltage		V_S	28	V
Peak Supply Voltage (for t = 50ms)		$V_{S(PEAK)}$	50	V
Output Peak Current	not Repetitive t = 100μs	$I_{O(PEAK)}$	4.5	A
	Repetitive f >10Hz		3.5	A
Power Dissipation (T_C= 70°C)	HZIP-15A	P_D	33	W
	HZIP-15D		30	
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-40~+150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	HZIP-15A	θ_{JC}	1.4	°C/W
	HZIP-15D		1.8	

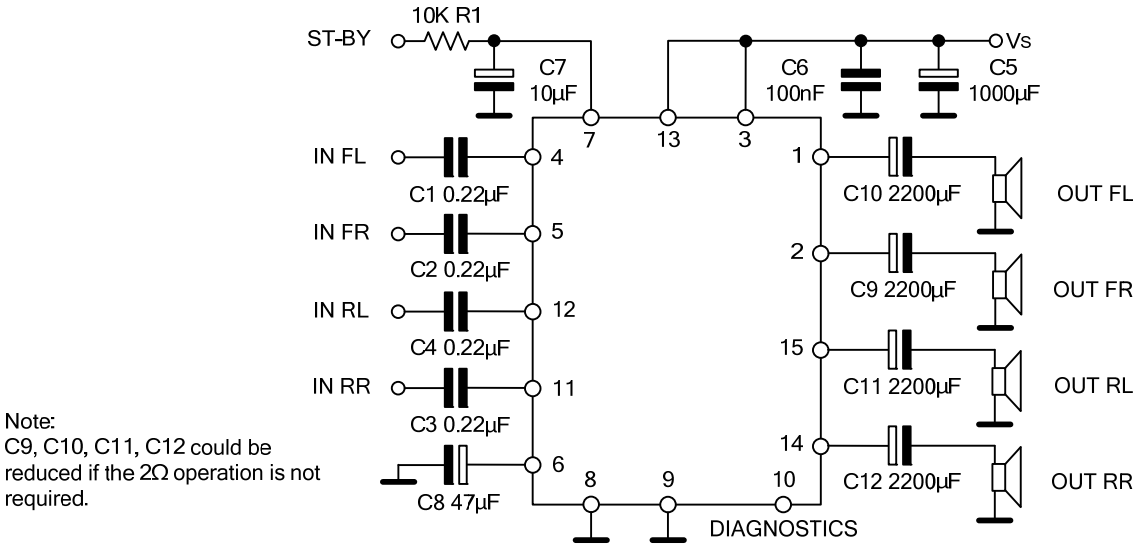
■ ELECTRICAL CHARACTERISTICS

(V_S = 14.4V; R_L = 4Ω; f = 1 KHz; T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Supply Voltage Range		V_S			8		18	V
ST-BY Threshold Voltage	IN	$V_{I(ST-BY)}$					1.5	V
	OUT	$V_{O(ST-BY)}$			3.5			
Voltage Saturation on pin 10		V_{SAT}	Sink Current at Pin 10 = 1mA				0.7	V
Output Offset Voltage		$V_{O(OFF)}$					150	mV
Input Noise Voltage		eN	Rg = 0; S.E. ”A” weighted,	Non Inverting Channels		2		μV
				Inverting Channels		5		
			Bridge, Rg = 0; 22Hz ~ 22KHz			3.5		μV
Total Quiescent Drain Current		I_Q	R_L = ∞				150	mA
ST-BY Pin Current(pin 7)		I_{ST-BY}	Max Driving Current Under Fault				5	mA
			Play Mode Vpin7 = 5V				50	μA
ST-BY Current Consumption		I_{ST-BY}	V_{ST-BY} = 0 ~ 1.5V				100	μA
Clipping Detector Output Average Current	OFF	$I_{CD(OFF)}$	d = 1% (Note 2)			90		μA
	ON	$I_{CD(ON)}$	d = 5% (Note 2)			160		μA
Input Impedance		R_{IN}	Single Ended		20	30		KΩ
			Bridge		10	15		
Output Power		P_{OUT}	THD = 10%; R_L = 4Ω	Bridge	18	20		W
				Single Ended	5.5	6		
				Single Ended, R_L = 2Ω		10		
Output Power (Note 3)	Max	$P_{O(MAX)}$	V_S = 14.4V, Bridge		31	35		W
	EIAJ	$P_{O(EIAJ)}$	V_S = 13.7V, Bridge		27	30		W
Distortion		THD	R_L = 4Ω	Single Ended, P_{OUT}=0.1~4W		0.02		%
				Bridge, P_{OUT} = 0.1 ~ 10W		0.03	0.3	
Cross Talk		CT	f = 1KHz Single Ended			70		dB
			f = 10KHz Single Ended			60		dB
			f = 1KHz Bridge		55			dB
			f = 10KHz Bridge			60		dB
Voltage Gain		G_V	Single Ended		19	20	21	dB
			Bridge		25	26	27	dB
Voltage Gain Match		G_V					0.5	dB
Supply Voltage Rejection		SVR	Rg = 0; f = 300Hz		50			dB
Stand-by Attenuation		A_{ST-BY}	P_O = 1W		80	90		dB

Note: 1. See built-in S/C protection description
2. Pin 10 Pulled-up to 5V with 10KΩ; R_L = 4Ω
3. Saturated square wave output.

■ TYPICAL TEST AND APPLICATION CIRCUIT



Note:
C9, C10, C11, C12 could be reduced if the 2Ω operation is not required.

Figure 1. Quad Stereo

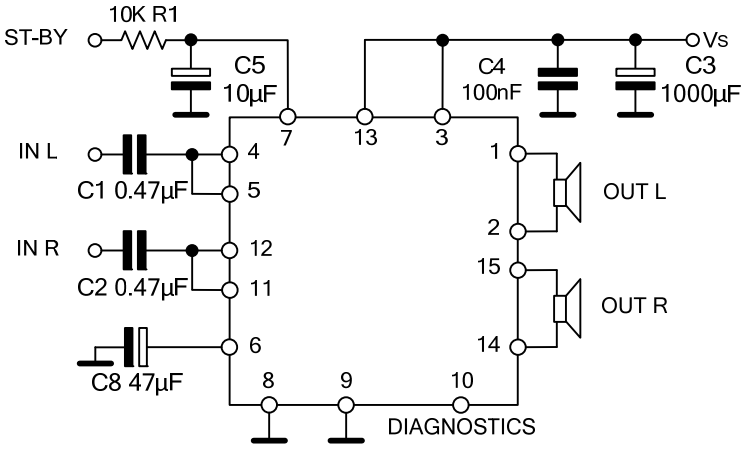


Figure 2. Double Bridge

■ TYPICAL TEST AND APPLICATION CIRCUIT (Cont.)

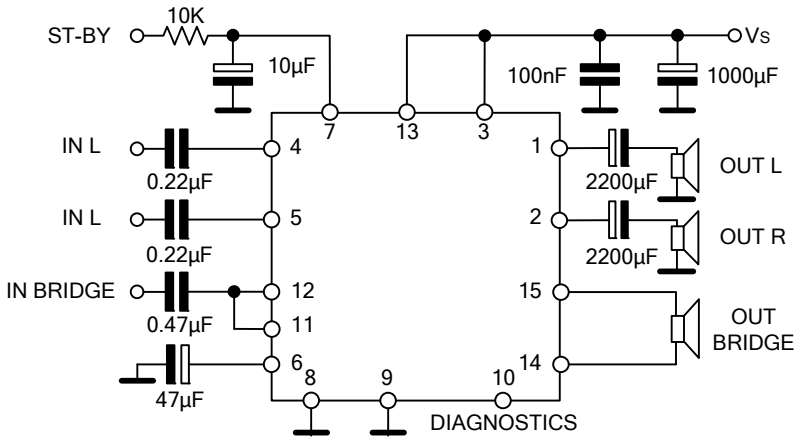


Figure 3. Stereo/Bridge

■ TYPICAL APPLICATION INFORMATION

Diagnostics Facility note:

UTC **TDA7377** built in a diagnostic circuitry, when following events appearing: clipping in the output signal, thermal shutdown, and output fault including short to GND, short to V_S and soft short at turn on.

When the event is detected, The information is available across an open collector output (pin 10) through a current sinking (see Fig 4).The current sinking at pin 10 is triggered when a certain distortion level is reached at any of the outputs. This function allows gain compression possibility whenever the amplifier is overdriven. The current sinking at pin 10 also can be triggered When the IC's operating temperature raise to about 10°C before the shutdown threshold.

Normally the clip detector signaling produces a low level at pin 10 that is shorter than that present under faulty conditions; This can be used to discriminate each event (clipping detection, output fault, thermal proximity).

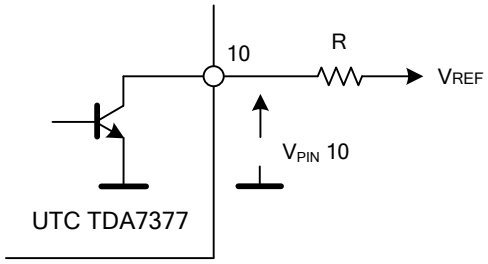


Figure 4. Pin10 Diagnostic Circuitry

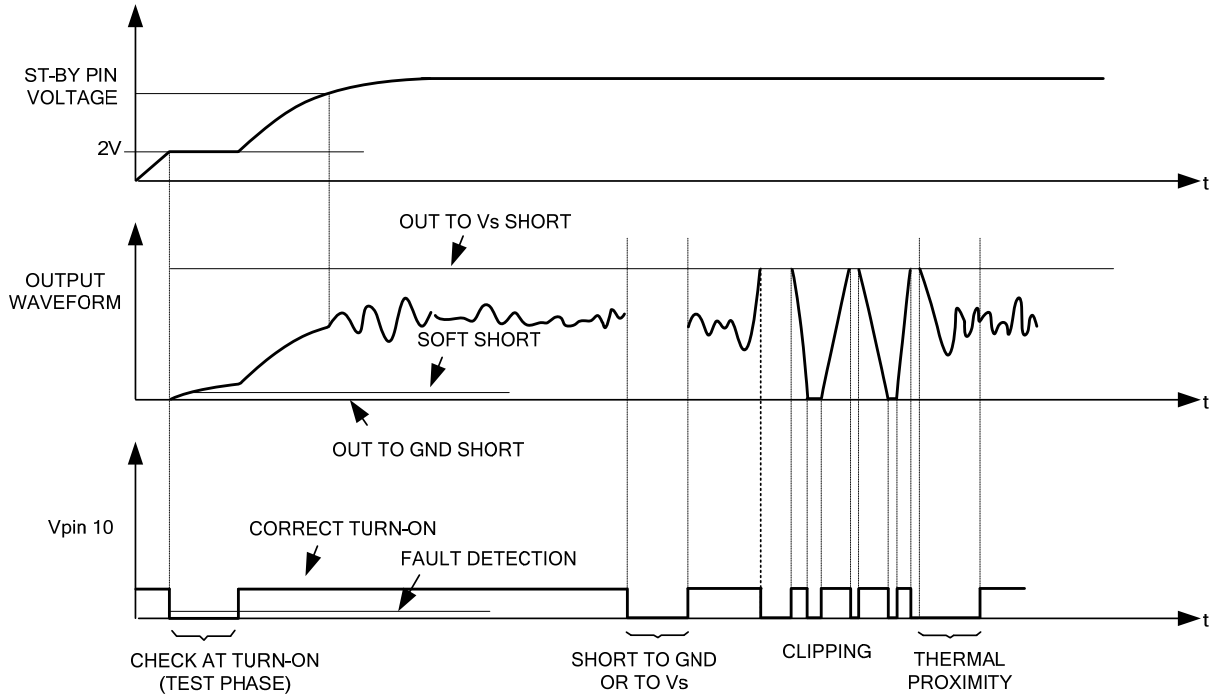
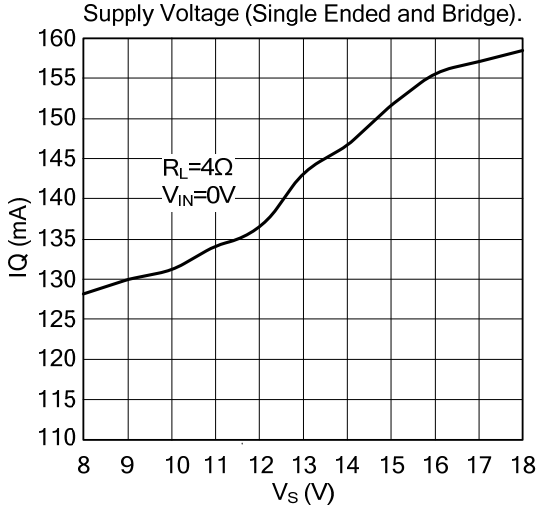


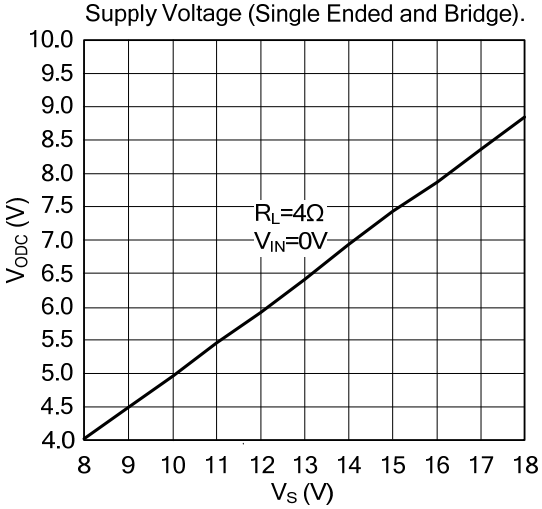
Figure 5. Waveforms

■ TYPICAL CHARACTERISTICS

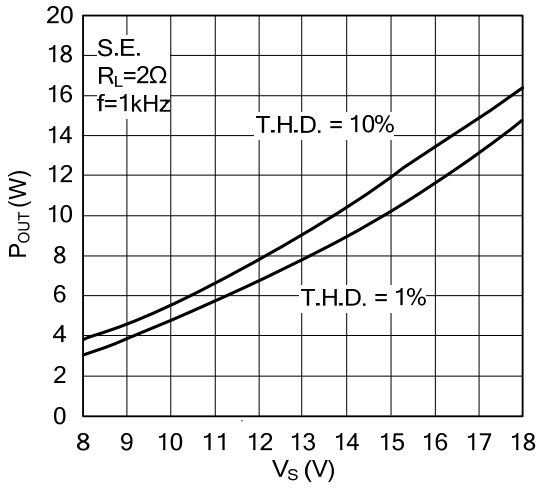
Quiescent Drain Current vs. Supply Voltage (Single Ended and Bridge).



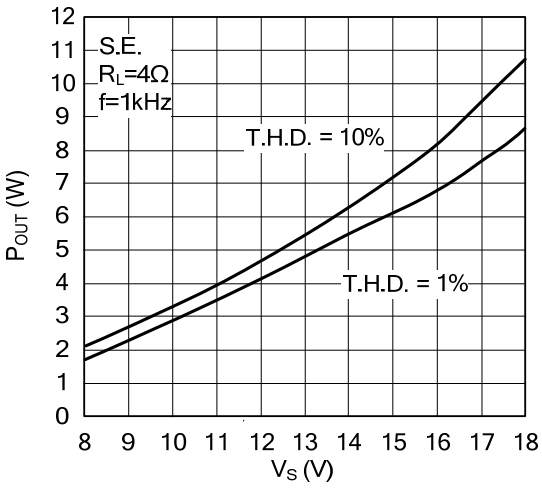
Quiescent Output Voltage vs. Supply Voltage (Single Ended and Bridge).



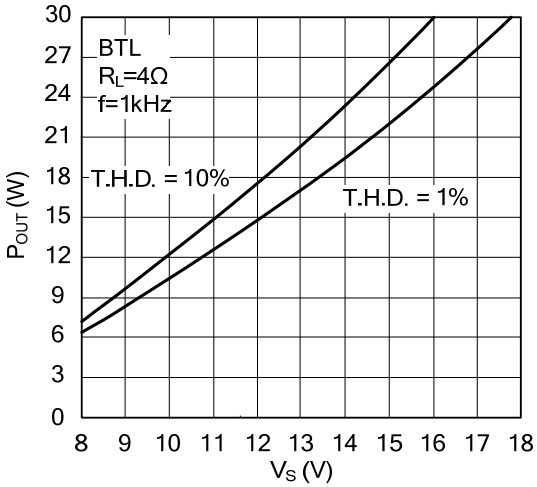
Output Power vs. Supply Voltage



Output Power vs. Supply Voltage



Output Power vs. Supply Voltage



Stand-by Attenuation vs. Threshold Voltage