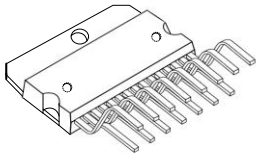
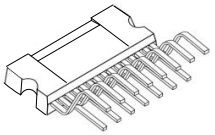
TDA7377 *LINEAR INTEGRATED CIRCUIT*

# 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

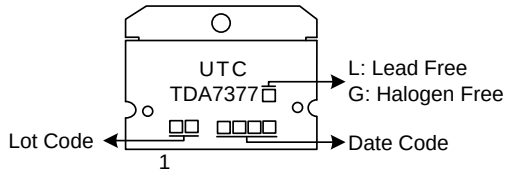
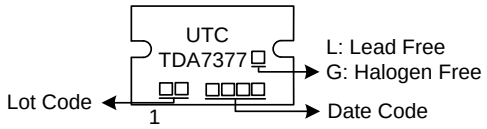
## ■ ORDERING INFORMATION

| 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 |

TDA7377G-J15-A-T
(1)Packing Type
(2)Package Type
(3)Green Package

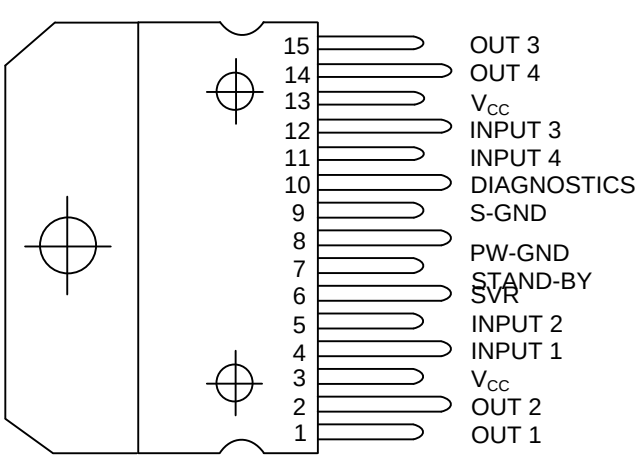
(1) T: Tube
(2) J15-A: HZIP-15A, J15-D: HZIP-15D
(3) G: Halogen Free and Lead Free, L: Lead Free

## ■ MARKING

| HZIP-15A | HZIP-15D |
|---|---|
|  |  |

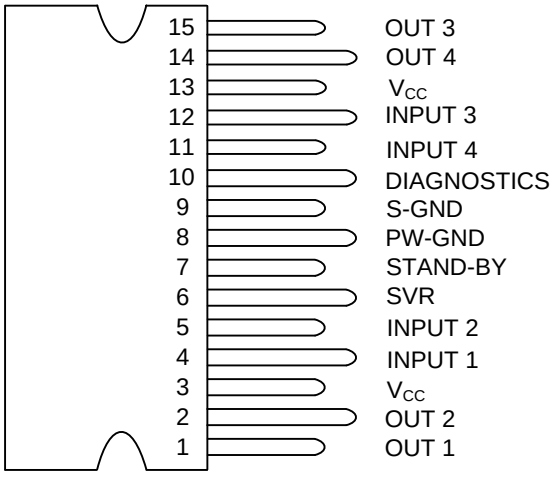


## ■ PIN CONNECTION





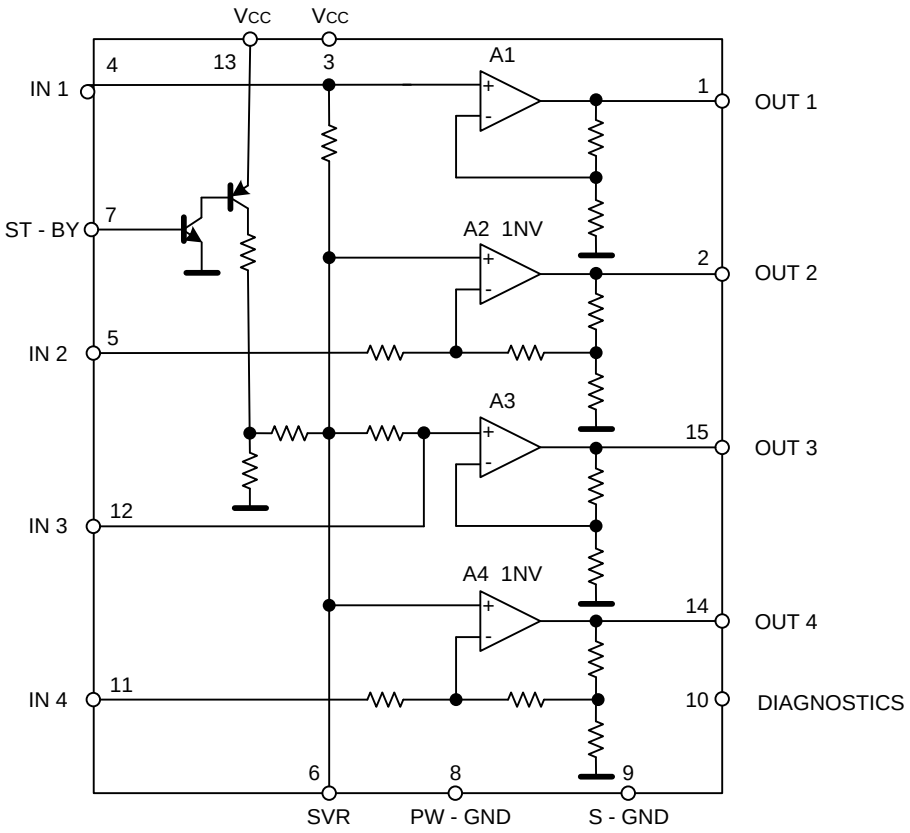
HZIP-15A





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 | $\theta_{JC}$ | 1.4 | °C/W |
| | HZIP-15D | | 1.8 | |

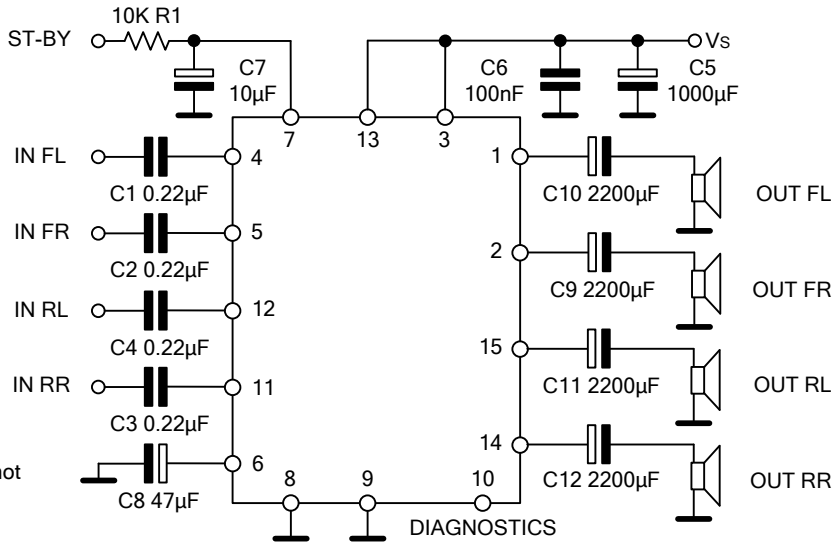
## ■ ELECTRICAL CHARACTERISTICS

($V_S$ = 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 |

Notes: 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

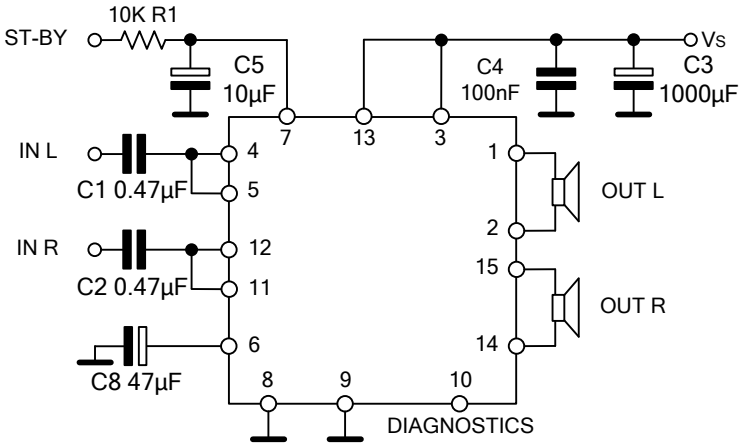



Figure 2. Double Bridge

## ■ TYPICAL TEST AND APPLICATION CIRCUIT (Cont.)

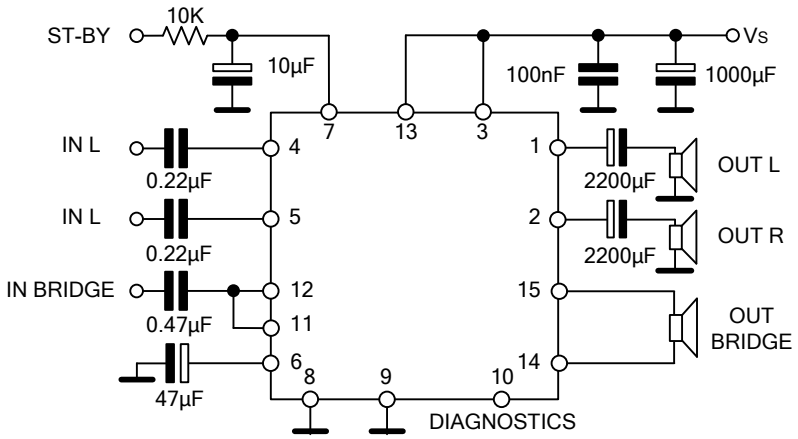



Figure 3. Stereo/Bridge

## ■ 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).

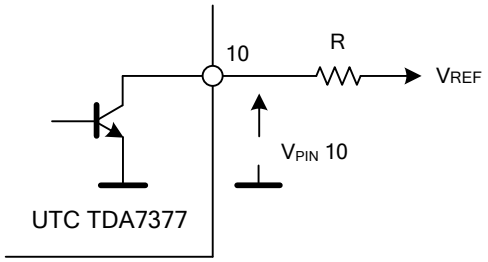



Figure 4. Pin10 Diagnostic Circuitry

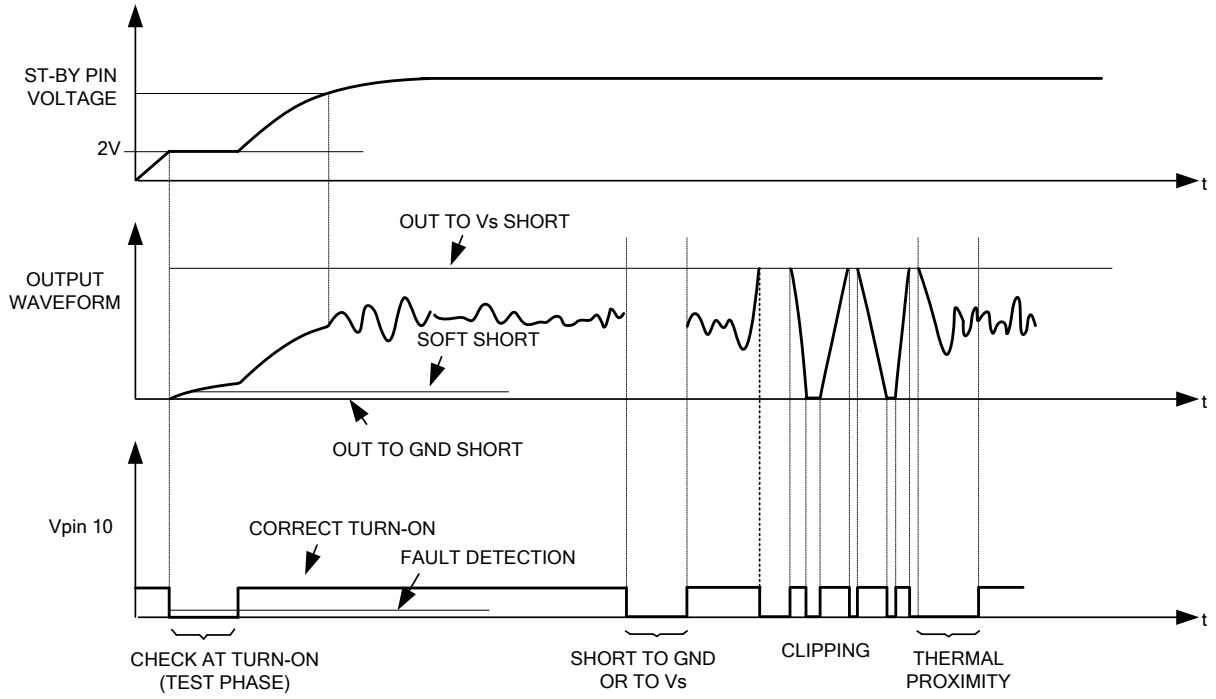
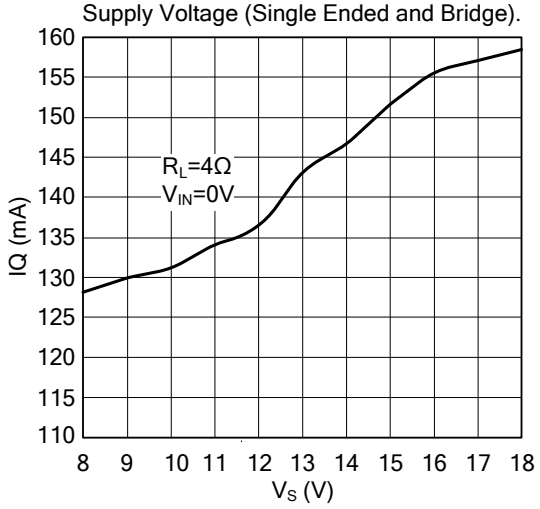


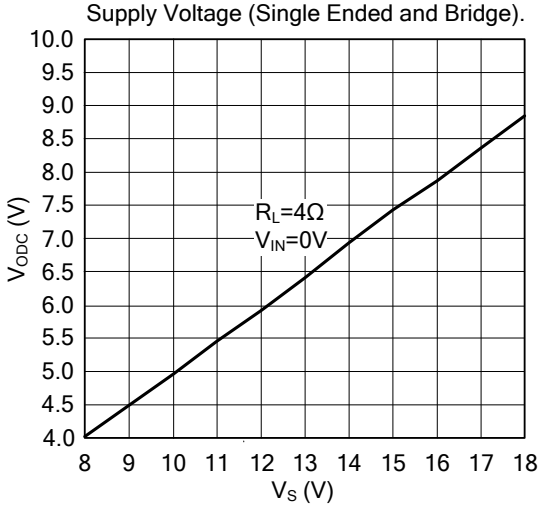

Figure 5. Waveforms

## ■ TYPICAL CHARACTERISTICS

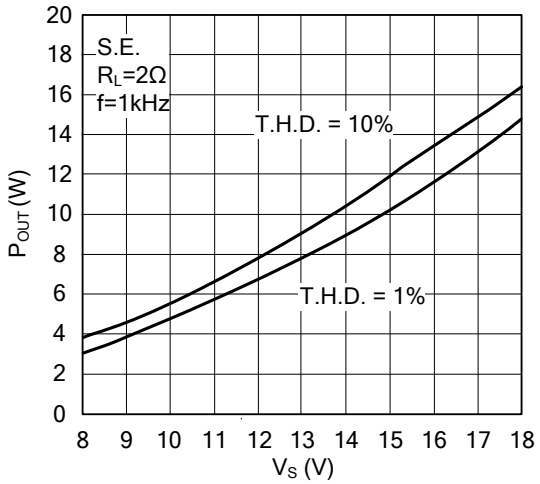
Quiescent Drain Current vs.
Supply Voltage (Single Ended and Bridge).



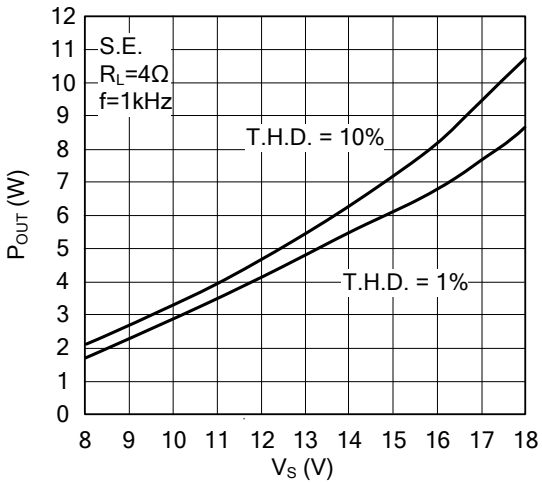

Quiescent Output Voltage vs.
Supply Voltage (Single Ended and Bridge).



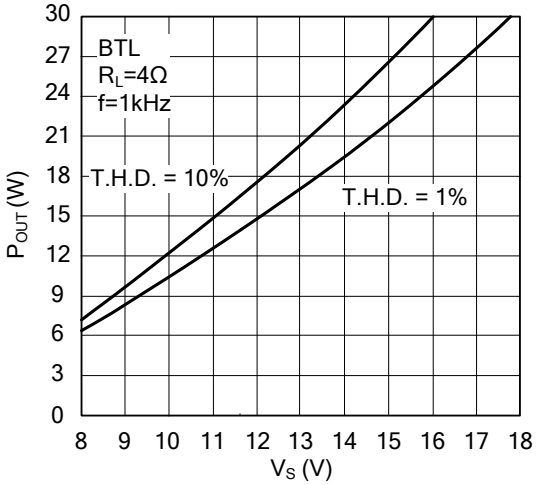

Output Power vs. Supply Voltage




Output Power vs. Supply Voltage




Output Power vs. Supply Voltage




Stand-by Attenuation vs. Threshold Voltage