



## TDA7377

## LINEAR INTEGRATED CIRCUIT

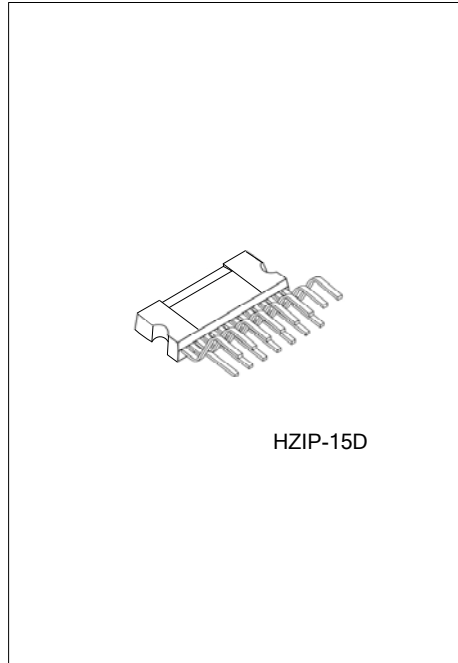
### 2 x 30W DUAL/QUAD POWER AMPLIFIER FOR CAR RADIO

#### 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@Vcc=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@Vcc=13.7V, RL=4Ω
- \* CMOS Compatible Stand-by Function (Low Icc)
- \* 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

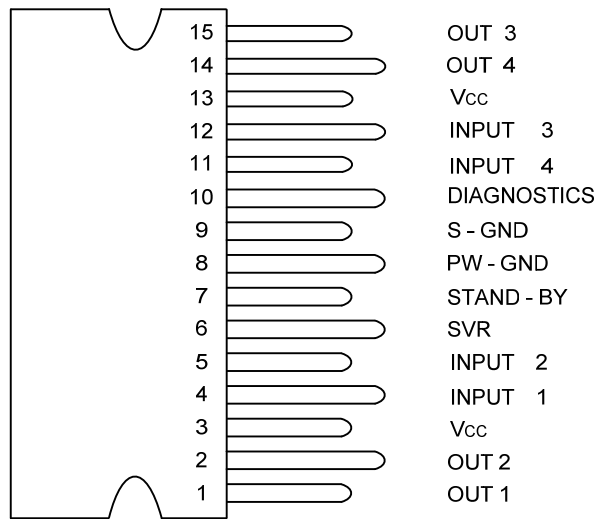
- \* Load Dump Voltages surge
- \* Reversed Battery
- \* Output DC Short Circuit protection with Low current when shorted to GND or Vcc.
- \* Output AC short circuit protection: across the load
- \* Silent Turn On/Off
- \* thermal shutdown
- \* Load very Inductive speakers
- \* Fortuitous Open GND
-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

#### ORDERING INFORMATION

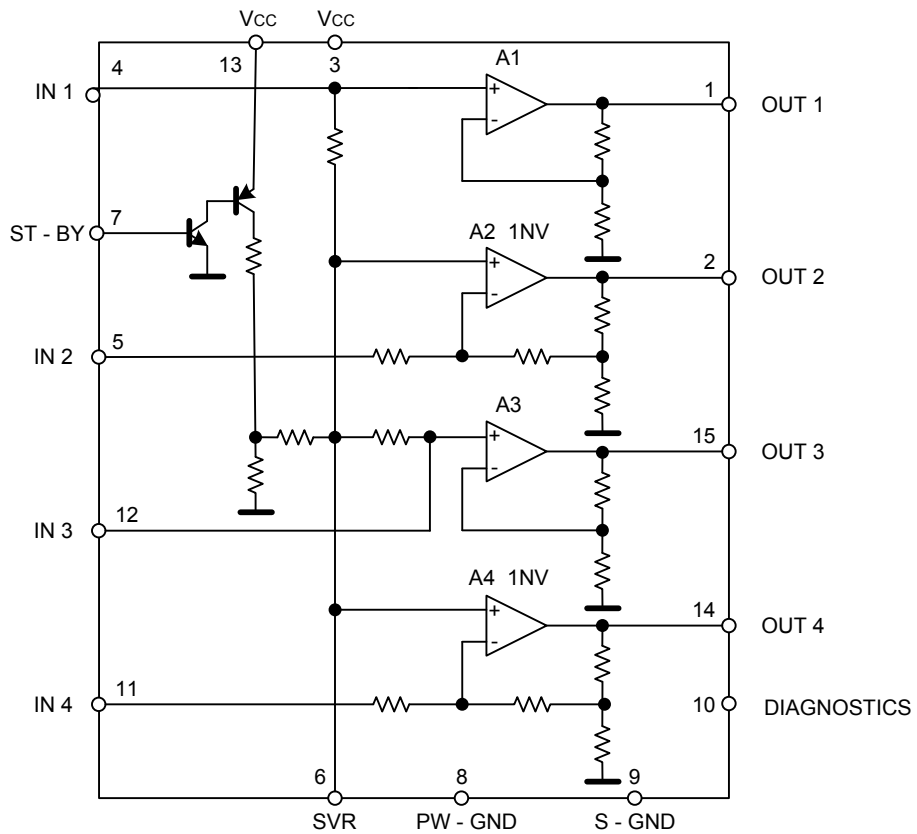
Ordering Number		Package	Packing
Lead Free	Halogen Free		
TDA7377L-J15-D-T	TDA7377G-J15-D-T	HZIP-15D	Tube

<p>TDA7377L-J15-D-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube (2) J15-D: HZIP-15D (3) G: Halogen Free, L: Lead Free</p>
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## ■ PIN CONNECTION



## ■ 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 $t = 50\text{ms}$ )	$V_{S(PEAK)}$	50	V	
Output Peak Current	$I_{O(PEAK)}$	not Repetitive $t = 100\mu\text{s}$	4.5	A
		Repetitive $f > 10\text{Hz}$	3.5	A
Power Dissipation ( $T_C = 85^\circ\text{C}$ )	$P_D$	36	W	
Junction Temperature	$T_J$	+150	$^\circ\text{C}$	
Storage Temperature	$T_{STG}$	-40~+150	$^\circ\text{C}$	

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	$\theta_{JC}$	1.8	$^\circ\text{C/W}$

### ■ ELECTRICAL CHARACTERISTICS

( $V_S = 14.4\text{V}$ ;  $R_L = 4\Omega$ ;  $f = 1\text{KHz}$ ;  $T_a = 25^\circ\text{C}$ , 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			V
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. Non Inverting Channels		2		$\mu\text{V}$
		"A" weighted, Inverting Channels		5		$\mu\text{V}$
		Bridge, Rg = 0; 22Hz ~ 22KHz		3.5		$\mu\text{V}$
Total Quiescent Drain Current	$I_Q$	$R_L = \infty$			150	mA
ST-BY Pin Current(pin 7)	$I_{ST-BY}$	Max Driving Current Under Fault			5	mA
		Play Mode $V_{pin7} = 5\text{V}$			50	$\mu\text{A}$
ST-BY Current Consumption	$I_{ST-BY}$	$V_{ST-BY} = 0 \sim 1.5\text{V}$			100	$\mu\text{A}$
Clipping Detector Output	OFF	$I_{CD(OFF)}$	$d = 1\%$ (Note 2)	90		$\mu\text{A}$
Average Current	ON	$I_{CD(ON)}$	$d = 5\%$ (Note 2)	160		$\mu\text{A}$
Input Impedance	$R_{IN}$	Single Ended	20	30		K $\Omega$
		Bridge	10	15		
Output Power	$P_{OUT}$	THD = 10%; $R_L = 4\Omega$	Bridge	18	20	W
			Single Ended	5.5	6	
			Single Ended, $R_L = 2\Omega$		10	
Output Power (Note 3)	Max	$P_{O(MAX)}$	$V_S = 14.4\text{V}$ , Bridge	31	35	W
	EIAJ	$P_{O(EIAJ)}$	$V_S = 13.7\text{V}$ , Bridge	27	30	W
Distortion	THD	$R_L = 4\Omega$	Single Ended, $P_{OUT} = 0.1 \sim 4\text{W}$		0.02	%
			Bridge, $P_{OUT} = 0.1 \sim 10\text{W}$		0.03	
Cross Talk	CT	$f = 1\text{KHz}$ Single Ended		70		dB
		$f = 10\text{KHz}$ Single Ended		60		dB
		$f = 1\text{KHz}$ Bridge	55	60		dB
		$f = 10\text{KHz}$ Bridge				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	$R_g = 0$ ; $f = 300\text{Hz}$	50			dB
Stand-by Attenuation	$A_{ST-BY}$	$P_O = 1\text{W}$	80	90		dB

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

## ■ TYPICAL TEST AND APPLICATION CIRCUIT

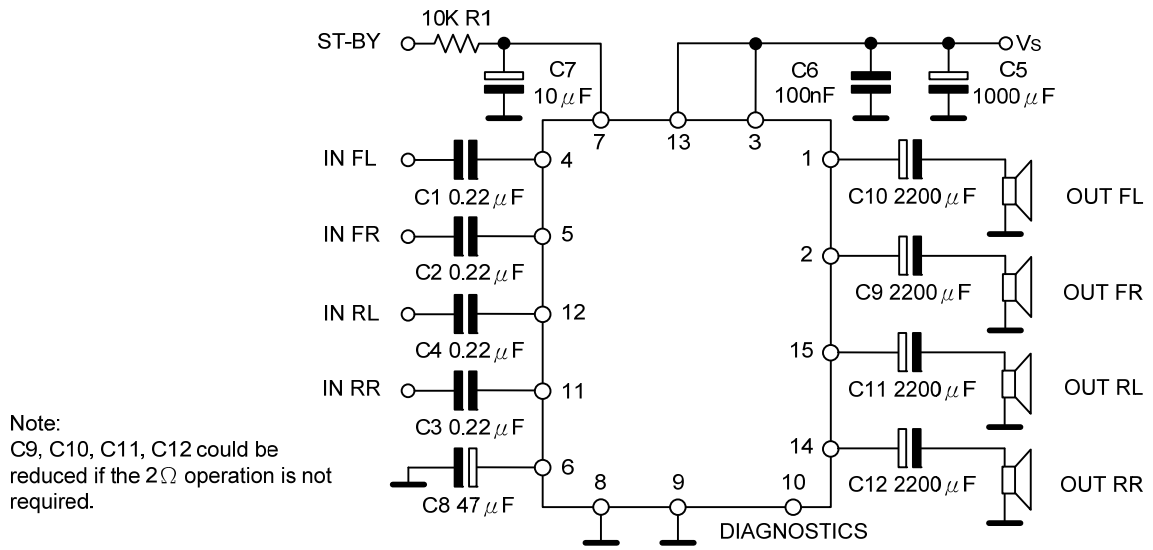


Figure 1. Quad Stereo

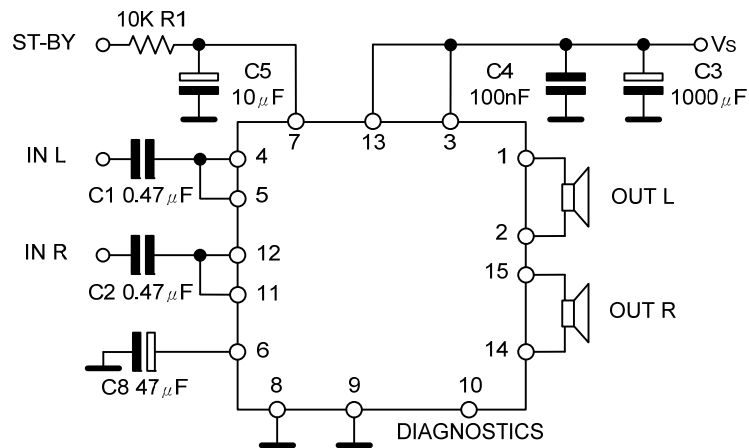


Figure 2. Double Bridge

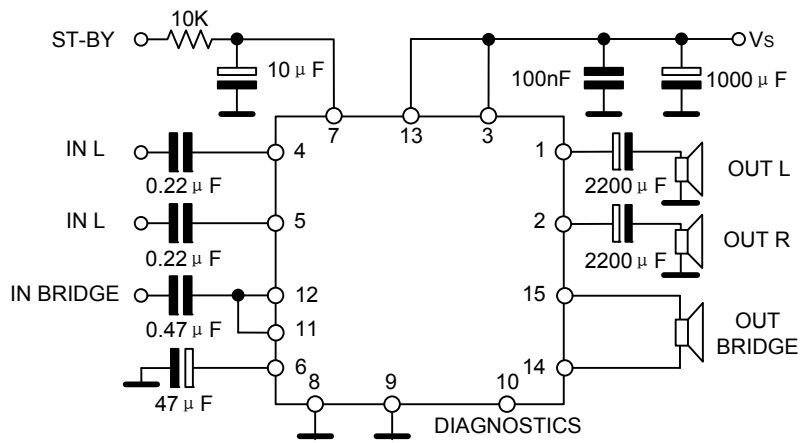


Figure 3. Stereo/Bridge

## ■ 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  $10^{\circ}\text{C}$  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).

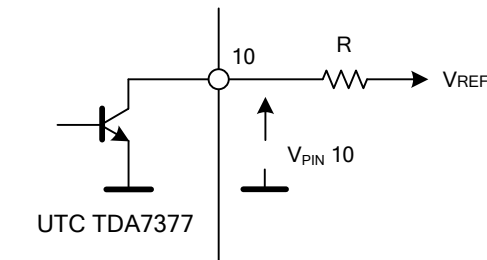


Figure 4. Pin10 Diagnostic Circuitry

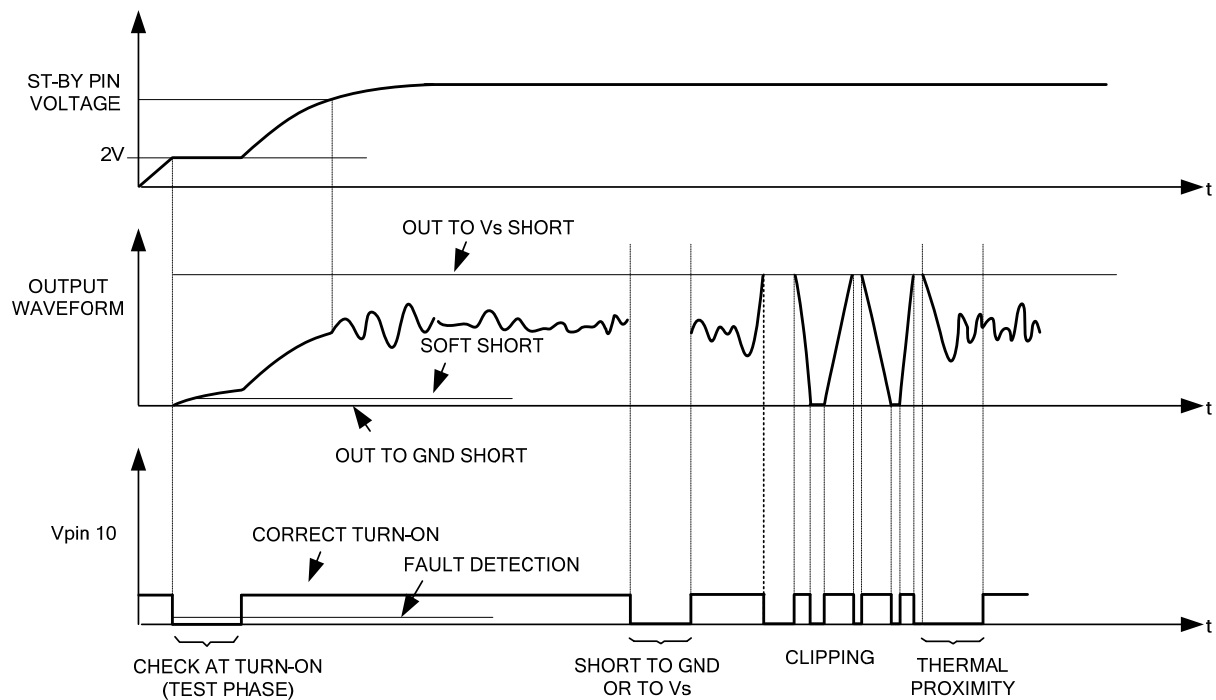
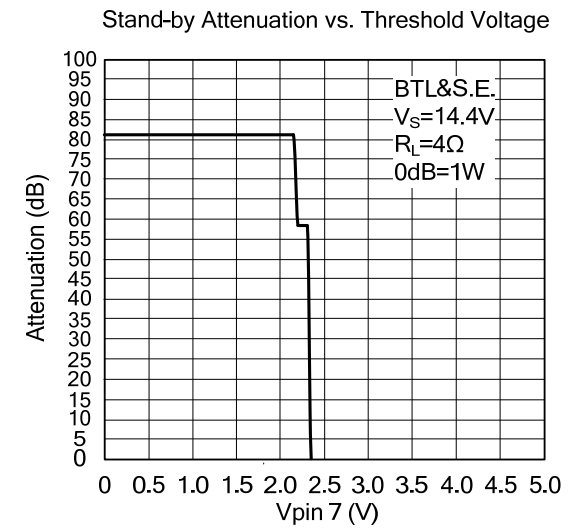
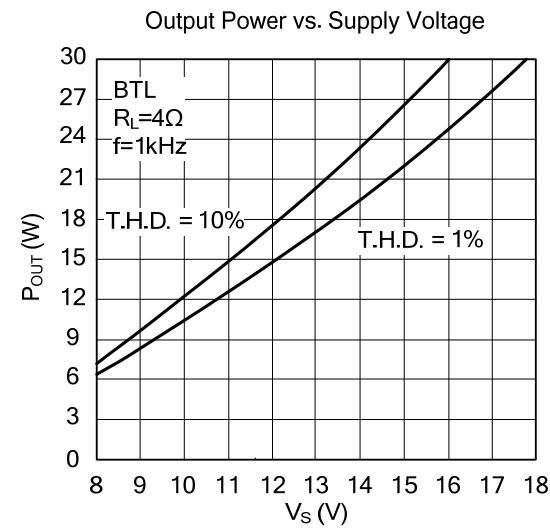
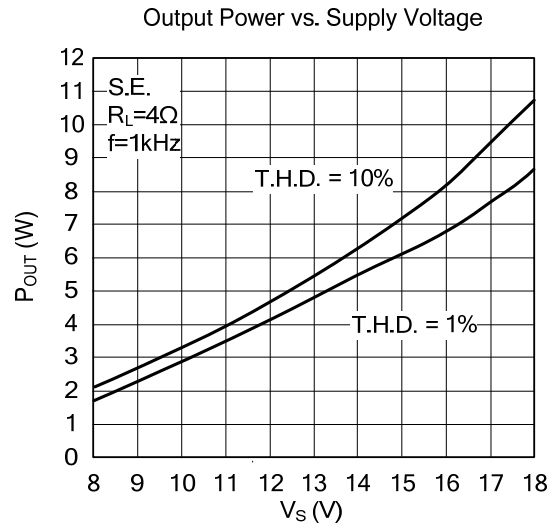
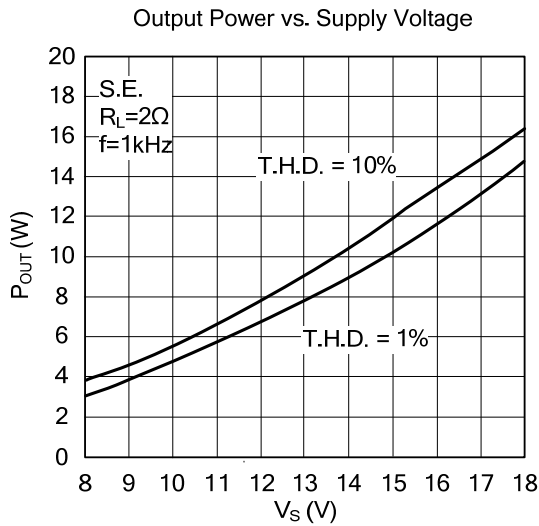
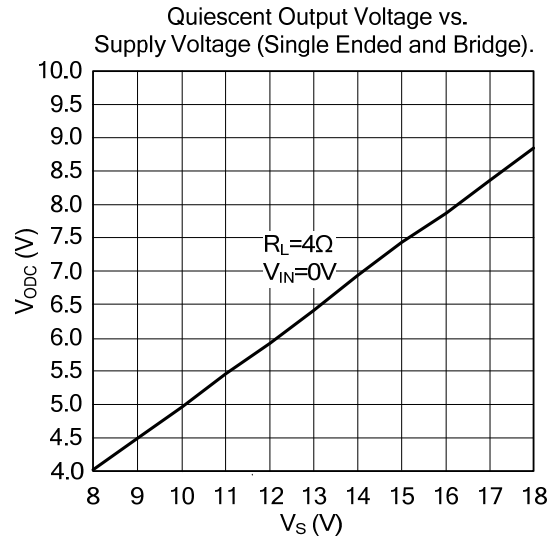
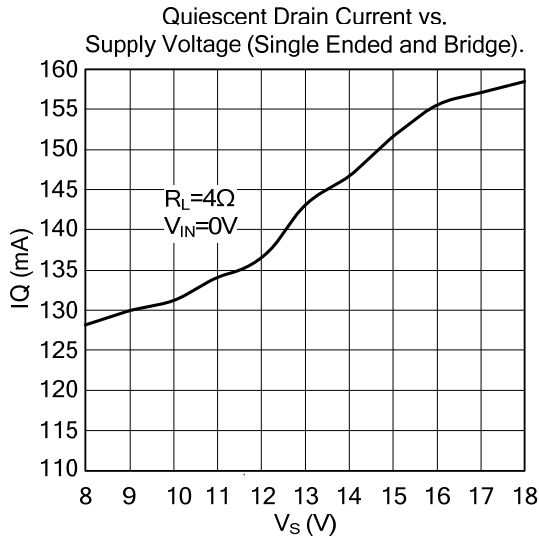


Figure 5. Waveforms

## TYPICAL CHARACTERISTICS



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