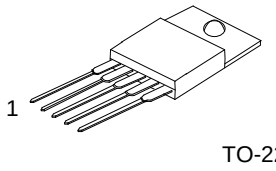
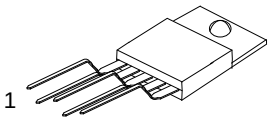
TDA2050

LINEAR INTEGRATED CIRCUIT

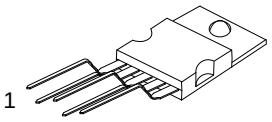
32W HI-FI AUDIO POWER AMPLIFIER



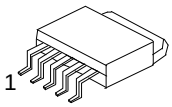
TO-220-5



TO-220B



TO-220B1



TO-263-5

■ DESCRIPTION

The UTC **TDA2050** is a monolithic integrated circuit with high power capability and is designed to use as an class AB audio amplifier. It can deliver typically 50W music power into 4Ω load over 1 sec at V_S=22.5V, f = 1KHz.

The device is most suitable for both Hi-Fi and high class TV sets on the strength of its high supply voltage and very low harmonic and crossover distortion.

■ FEATURES

* High output power (50W Music Power IEC 268.3 Rules)
* High operating supply voltage (50V)
* Single or split supply operations
* Very low distortion
* Short circuit protection (OUT to GND)
* Thermal shutdown

■ ORDERING INFORMATION

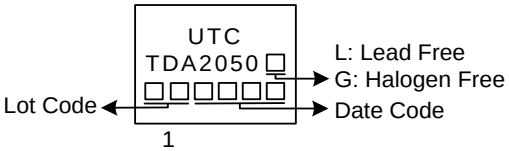
Ordering Number		Package	Packing
Lead Free	Halogen Free		
TDA2050L-TA5-T	TDA2050G-TA5-T	TO-220-5	Tube
TDA2050L-TB5-T	TDA2050G-TB5-T	TO-220B	Tube
TDA2050L-TB51-T	TDA2050G-TB51-T	TO-220B1	Tube
TDA2050L-TQ5-T	TDA2050G-TQ5-T	TO-263-5	Tube
TDA2050L-TQ5-R	TDA2050G-TQ5-R	TO-263-5	Tape Reel

TDA2050G-TA5-T

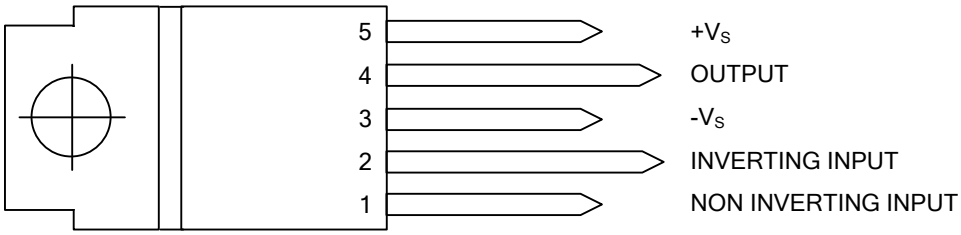
(1) Packing Type
(2) Package Type
(3) Green Package

(1) T: Tube, R: Tape Reel
(2) TA5: TO-220-5, TB5: TO-220B, TB51: TO-220B1
TQ5: TO-263-5
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

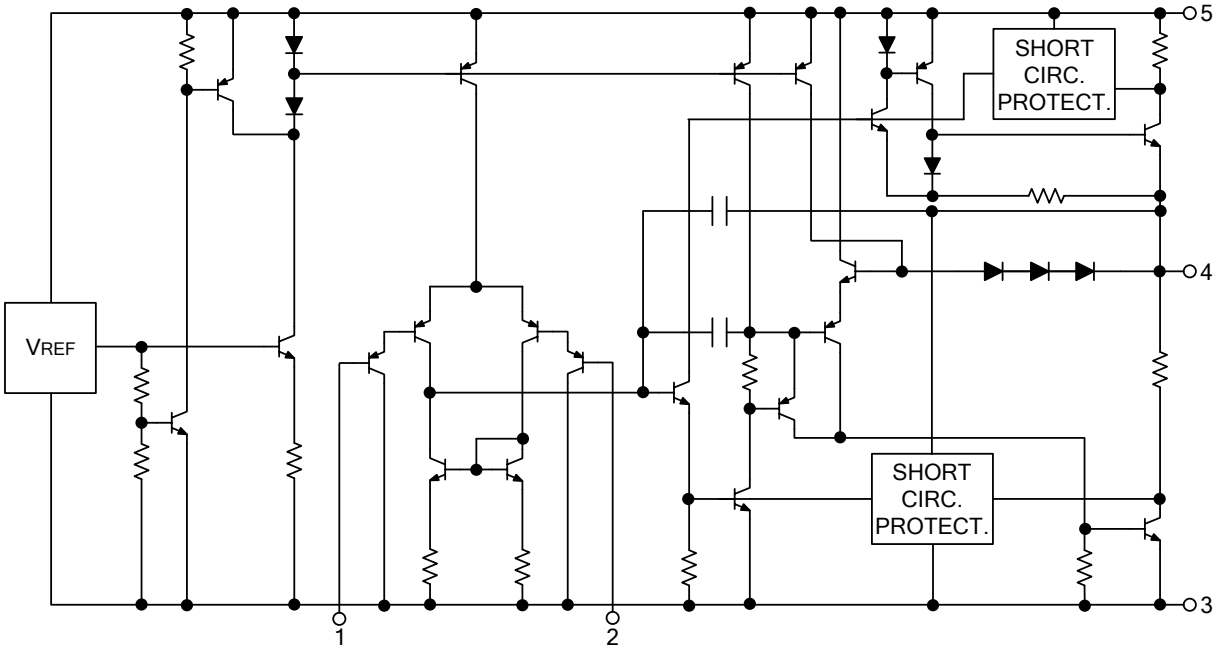


■ PIN CONFIGURATION



*TAB CONNECTED TO PIN 3

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_S	±25	V
Input Voltage	V_{IN}	V_S	V
Differential Input Voltage	$V_{IN(DIFF)}$	±15	V
Output Peak Current (internally limited)	I_{OUT}	5	A
Power Dissipation T_C= 75°C	P_D	25	W
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Note: 1. 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
Thermal Resistance junction-case	θ_{JC}	3	°C/W

■ ELECTRICAL CHARACTERISTICS

(Refer to the Test Circuit, V_S = ±18V, T_A= 25°C, f = 1 kHz, unless otherwise specified.)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Supply Voltage		V_S			±4.5		±25	V
Quiescent Drain Current		I_D	V_S=±4.5V			18	50	mA
			V_S=±25V			21	90	
Input Bias Current		I_B	V_S=±22V			0.4	0.5	μA
Input Offset Voltage		$V_{IN(OS)}$	V_S=±22V				±15	mV
Input Offset Current		$I_{IN(OS)}$	V_S=±22V				±200	nA
RMS Output Power	D = 0.5%	P_O	R_L=4Ω		24	27		W
			R_L=8Ω			18		
			R_L=8Ω, V_S=±22V		22	25		
	D = 10%		R_L=4Ω			35		
			R_L=8Ω			22		
			R_L=8Ω, V_S=±22V			32		
Music Power IEC268.3 RULES			D=10%, T=1s, V_S=±22.5V, R_L=4Ω			50		
Total Harmonic Distortion		THD	R_L=4Ω	f=1kHz, P_O=0.1~24W		0.03	0.5	%
				f =100Hz~10kHz, P_O=0.1~18W			0.5	
			R_L=8Ω, V_S=±22V	f=1kHz, P_O=0.1~20W		0.02		
				f=100Hz~10kHz, P_O=0.1~15W			0.5	
Slew Rate		SR			5	8		V/μs
Open Loop Voltage Gain		G_V				80		dB
Closed Loop Voltage Gain		G_V			30	30.5	31	dB
Power Bandwidth (-3dB)		B_W	R_L=4Ω, V_{IN}=200mV		20 ~ 80000			Hz
Total Input Noise		e_N	Curve A B=22Hz~22kHz			4 5	10	μV
Input Resistance (pin 1)		R_{IN}			500			kΩ
Supply Voltage Rejection		SVR	R_S=22KΩ, f=100Hz, V_{RIPPLE}=0.5Vrms			45		dB
Efficiency		η	P_O=28W, R_L=4Ω			65		%
			P_O=25W, R_L=8Ω, V_S=±22V			67		

■ TYPICAL APPLICATION CIRCUIT

FOR SPLIT SUPPLY APPLICATION SUGGESTIONS

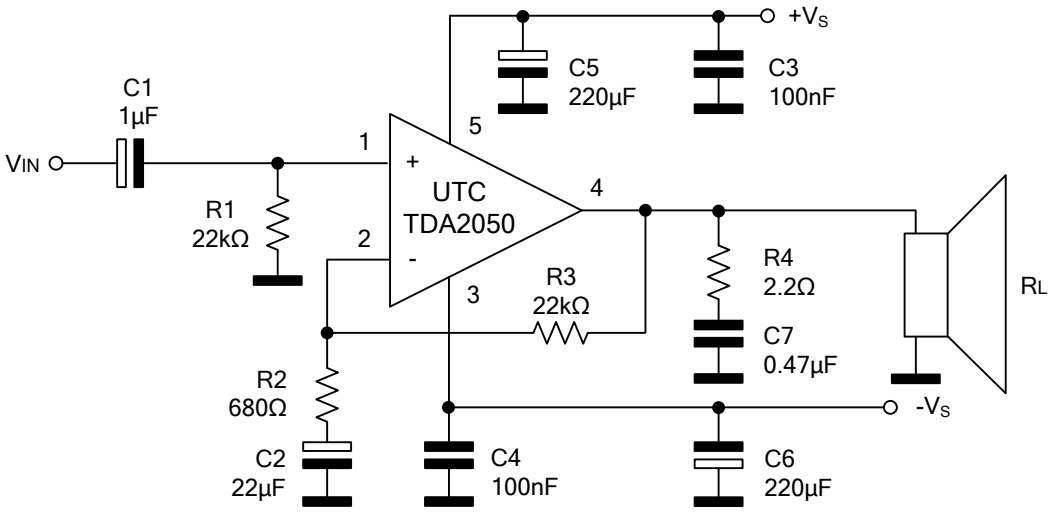


Figure.1 Split Supply Typical Application Circuit

The following table demonstrates the recommended values of the external components are those shown on above circuit. Different values can be used.

COMPONENT	PURPOSE	RECOMMENDED VALUE		
		TYPICAL	LARGER	SMALLER
R1	Input Impedance	22kΩ	Increase of Input Impedance	Decrease of Input Impedance
R2	Feedback Resistor	680Ω	Decrease of Gain*	Increase of Gain
R3		22kΩ	Increase of Gain	Decrease of Gain*
R4	Frequency Stability	2.2Ω	Danger of Oscillations	
C1	Input Decoupling DC	1µF		Higher Low-frequency cut-off
C2	Inverting Input DC Decoupling	22µF	Increase of Switch ON/OFF Noise	Higher Low-frequency cut-off
C3, C4	Supply Voltage Bypass	100nF		Danger of Oscillations
C5, C6	Supply Voltage Bypass	220µF		Danger of Oscillations
C7	Frequency Stability	0.47µF		Danger of Oscillations

* The gain must be higher than 24dB

■ TYPICAL APPLICATION CIRCUIT(CONT.)

FOR SINGLE SUPPLY APPLICATION SUGGESTIONS

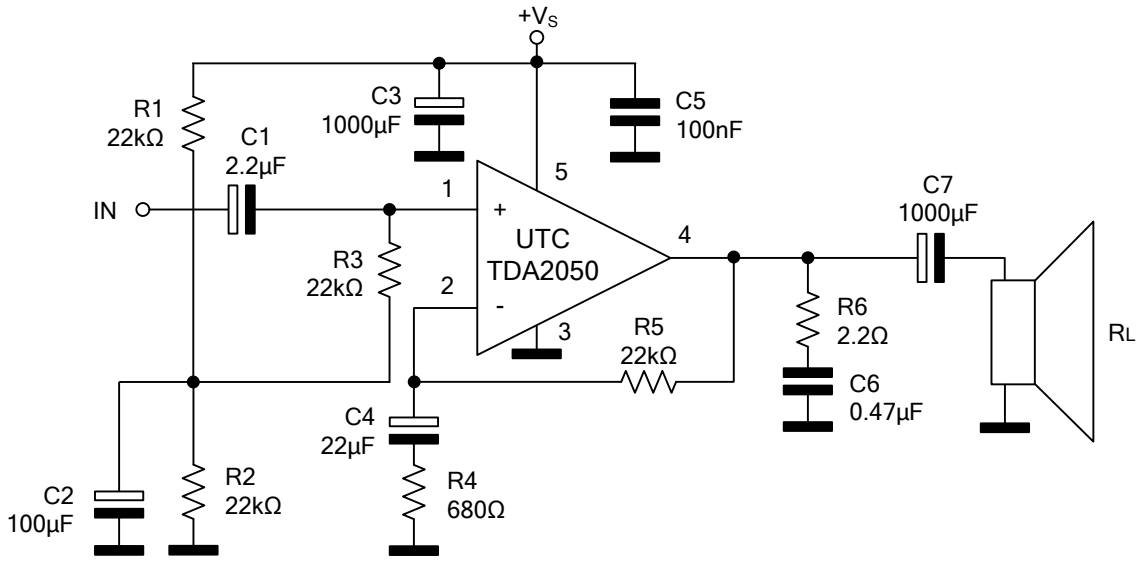


Figure.2 Single Supply Typical Application Circuit

The following table demonstrates the recommended values of the external components are those shown on above circuit. Different values can be used.

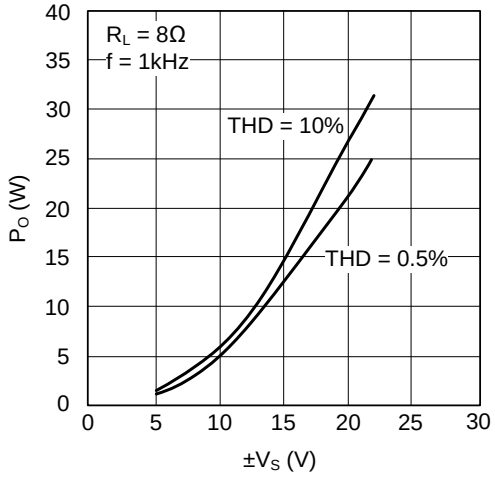
COMPONENT	PURPOSE	RECOMMENDED VALUE		
		TYPICAL	LARGER	SMALLER
R1, R2, R3	Biasing Resistor	22kΩ		
R4	Feedback Resistor	680Ω	Decrease of Gain*	Increase of Gain
R5		22kΩ	Increase of Gain	Decrease of Gain*
R6	Frequency Stability	2.2Ω	Danger of Oscillations	
C1	Non-Inverting Input Decoupling DC	2.2μF		Higher Low-frequency cut-off
C2	Supply Voltage Rejection	100μF	Worse Turn-off Transient Worse Turn-on Delay	
C3	Supply Voltage Bypass	1000μF		Danger of Oscillations Worse of Turn-off Transient
C4	Inverting Input DC Decoupling	22μF	Increase of Switch ON/OFF	Higher Low-frequency cut-off
C5	Supply Voltage Bypass	100nF		Danger of Oscillations
C6	Frequency Stability	0.47μF		Danger of Oscillations
C7	Output DC Decoupling	1000μF		Higher Low-frequency cut-off

* The gain must be higher than 24dB

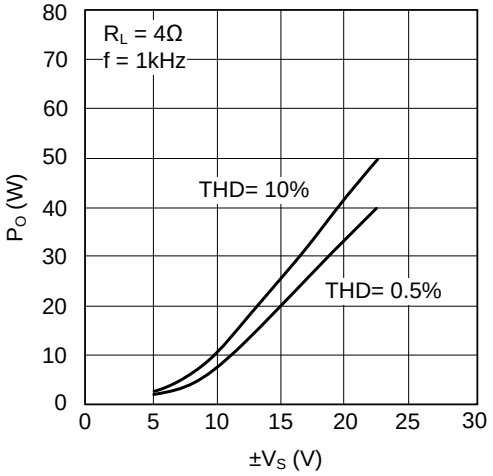
Note: If the supply voltage is lower than 40V and the load is 8Ω (or more), a lower value of C2(i.e. 22μF) can be used. C7 can be larger than 1000μF only if the supply voltage does not exceed 40V.

■ TYPICAL CHARACTERISTICS (Split Supply Test Circuit, unless otherwise specified)

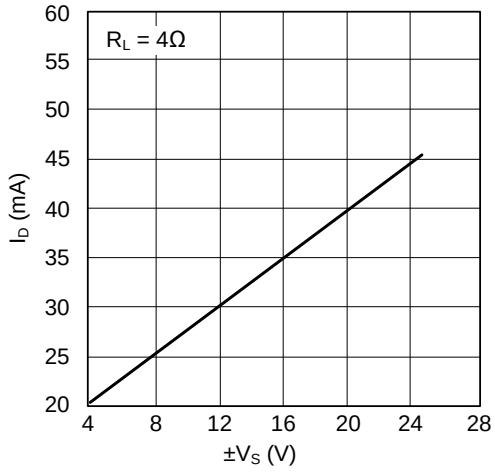
Output Power vs. Supply Voltage



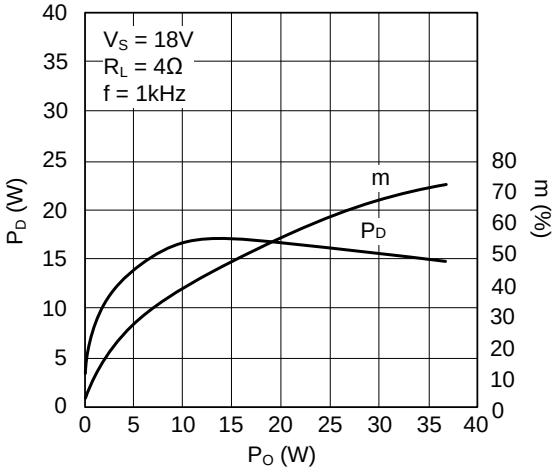
Output Power vs. Supply Voltage



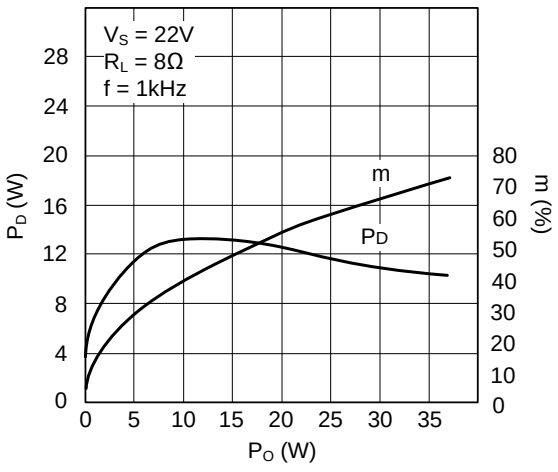
Quiescent Current vs. Supply Voltage



Total Power Dissipation and Efficiency vs. Output Power



Total Power Dissipation and Efficiency vs. Output Power



Maximum Allowable Power Dissipation vs. Ambient Temperature