

CERAMIC SPEAKER DRIVE AMPLIFIER

FEATURES

- Wide Operating Voltage Range ($V_{CC} = 1.8$ to 5.5 V)
- Very Low Supply Current ($I_{CC} = 1.8$ mA @ $V_{CC} = 2.4$ V)
- Very Low Standby Current ($I_{STBY} = 0.1$ μ A)
- Miniature Package (SOT23L-6)
- Very Large Output Voltage ($V_{OUT(MAX)} = 1.7$ Vrms @ $V_{CC} = 2.4$ V, $R_L = 620$ Ω)
- Very Small Total Harmonic Distortion (THD = 0.1 % @ $V_{OUT} = 0.8$ Vrms)
- Needs No Output Coupling Capacitor

APPLICATIONS

- Speaker Driver for Portable Equipment
- Headphone Driver
- Toys and Games

DESCRIPTION

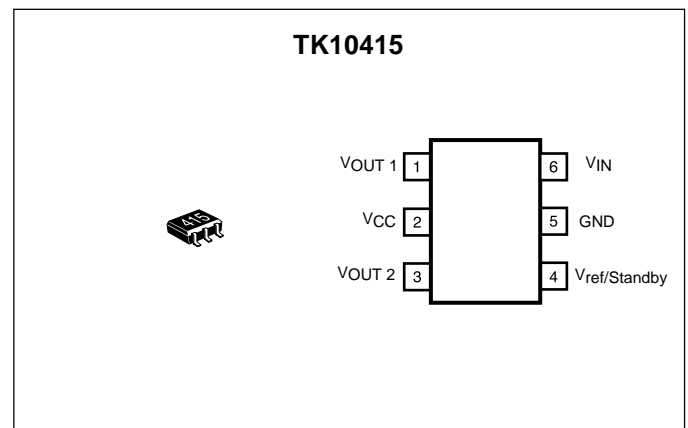
The TK10415M is a very low operating voltage and current audio power amplifier to drive ceramic speakers.

The TK10415M drives the speaker directly, because the device has a differential output that does not need an output coupling capacitor.

The voltage gain is adjustable by two external resistors.

The TK10415M is available in the very small SOT23L-6 surface mount package.

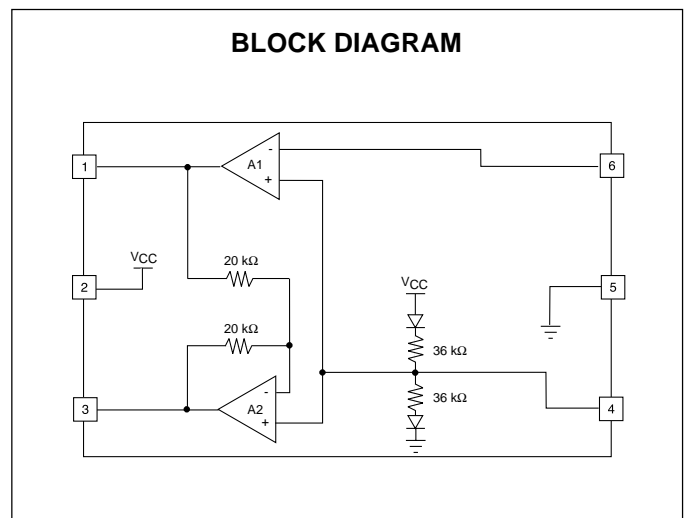
The small package in conjunction with few external components saves printed circuit board space.



ORDERING INFORMATION

TK10415M Tape/Reel Code

TAPE/REEL CODE
TL: Tape Left



TK10415

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	6 V	Storage Temperature Range	-55 to +150 °C
Operating Voltage	1.8 to 5.5 V	Operating Temperature Range	-20 to +70 °C
Power Dissipation (Notes 1 and 2).....	400 mW		

TK10415 ELECTRICAL CHARACTERISTICS

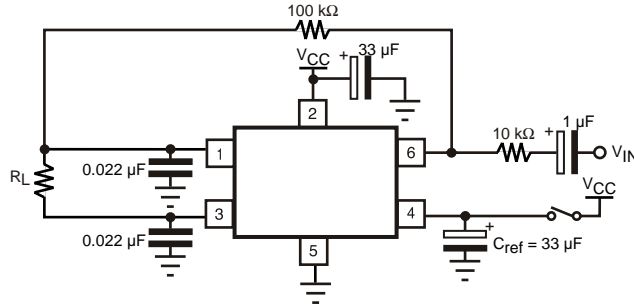
Test Conditions: $V_{CC} = 2.4 \text{ V}$, $f = 1.0 \text{ kHz}$, $R_L = 620 \Omega$, $T_A = 25 \text{ }^\circ\text{C}$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC}	Supply Current	$V_{CC} = 2.4 \text{ V}$, $R_L = \infty$		1.8	3.0	mA
		$V_{CC} = 5.0 \text{ V}$, $R_L = \infty$		2.2	3.5	mA
I_{STBY}	Standby Supply Current	$V_{CC} = 2.4 \text{ V} = \text{Pin 4}$, $R_L = \infty$		0.0	2.0	μA
I_{CONT}	Control Terminal Current	Pin 4 Sink Current, $V_{\text{Pin4}} = V_{CC}$		53.0	90.0	μA
V_{THS}	Standby Threshold Voltage	Pin 4	$V_{CC} - 0.4$			V
G_{VO}	Open Circuit Voltage Gain	AMP1		60.0		dB
G_V	Voltage Gain	AMP1	17.0	20.0	23.0	dB
		AMP2	-3.0	0.0	3.0	dB
		AMP1 + AMP2	23.0	26.0	29.0	dB
THD	Total Harmonic Distortion	$V_{CC} = 2.4 \text{ V}$, $V_{OUT} = 0.8 V_{rms}$		0.1	1.0	%
		$V_{CC} = 5.0 \text{ V}$, $V_{OUT} = 2.0 V_{rms}$		0.1	1.0	%
$V_{OUT(MAX)}$	Maximum Output Voltage	$V_{CC} = 2.4 \text{ V}$, THD $\leq 10\%$	1.2	1.7		V_{rms}
		$V_{CC} = 5.0 \text{ V}$, THD $\leq 10\%$	2.6	3.7		V_{rms}
RR	Ripple Rejection Ratio	$C_{ref} = 33 \mu\text{F}$		38.0		dB
$V_{OUT(DC)}$	DC Voltage at Output Terminal	V_{OUT1}	1.00	1.20	1.40	V
		V_{OUT2}	1.00	1.20	1.40	V
$V_{OUT(OS)}$	Output Offset Voltage	$V_{OUT2} - V_{OUT1}$	-30.0	0.0	30.0	mV
R_L	Load Resistance		100	620		Ω

Note 1: Power dissipation is 400 mW in free air. Derate at 3.2 mW/°C for operation above 25 °C.

Note 2: Power dissipation is 600 mW when mounted. Derate at 4.8 mW/°C for operation above 25 °C.

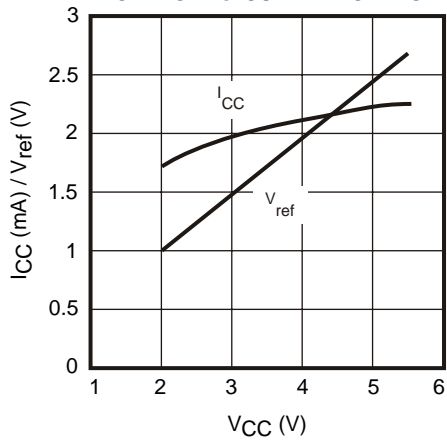
TEST CIRCUIT



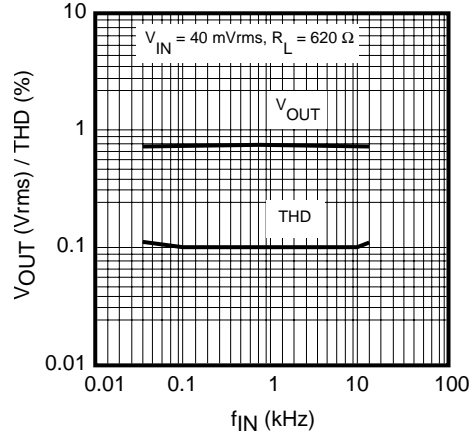
TYPICAL PERFORMANCE CHARACTERISTICS

$V_{CC} = 5\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified.

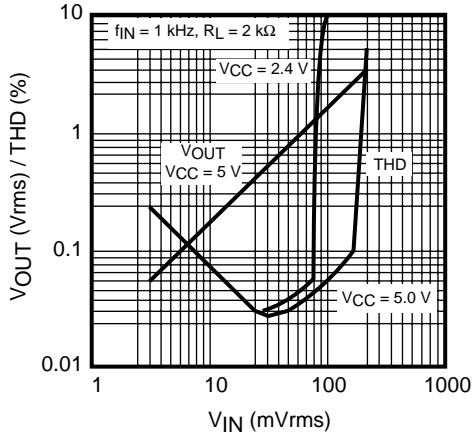
SUPPLY CURRENT and REFERENCE VOLTAGE vs. SUPPLY VOLTAGE



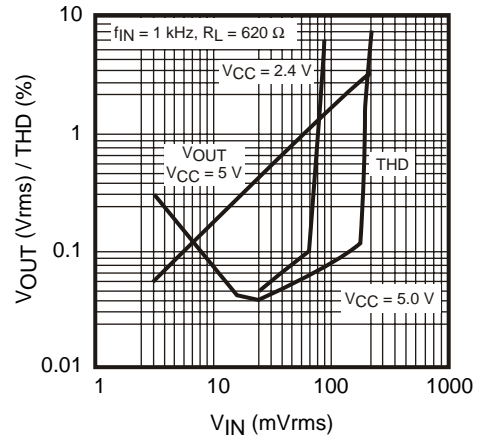
OUTPUT VOLTAGE AND DISTORTION vs. FREQUENCY



OUTPUT VOLTAGE AND DISTORTION vs. INPUT VOLTAGE 1

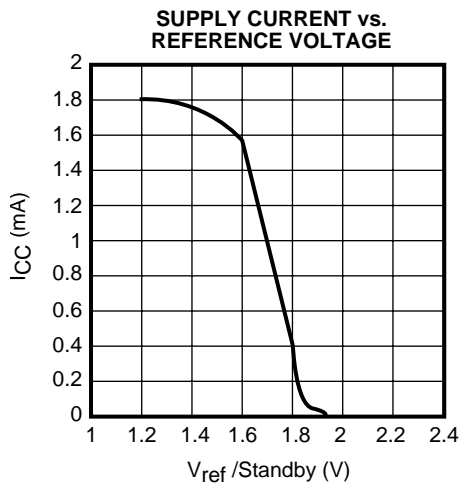
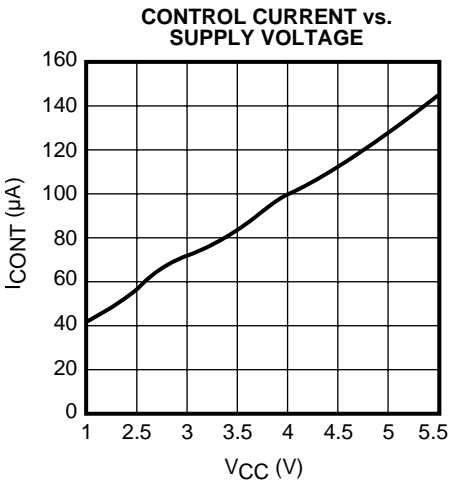
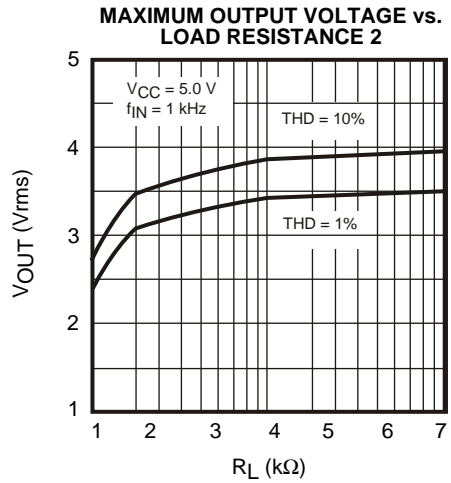
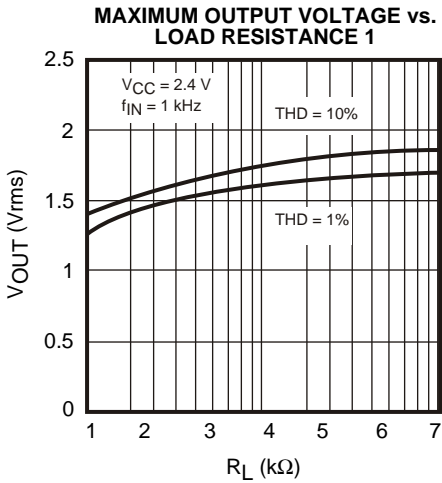
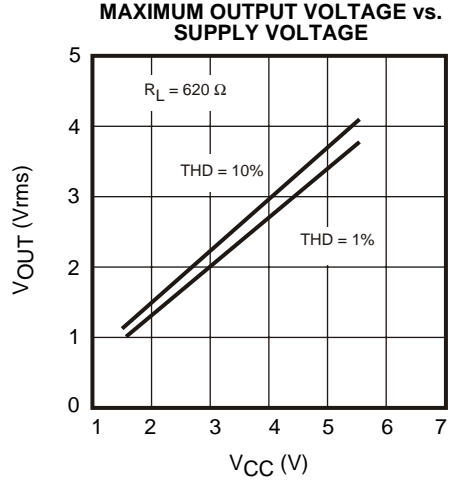
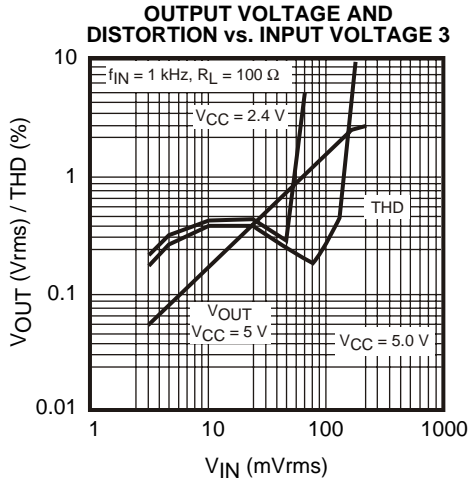


OUTPUT VOLTAGE AND DISTORTION vs. INPUT VOLTAGE 2

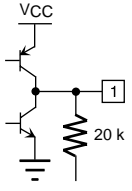
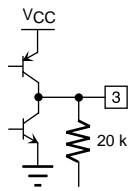
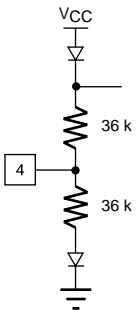
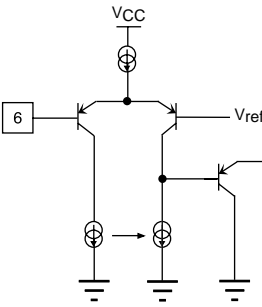


TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

$V_{CC} = 5\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified.



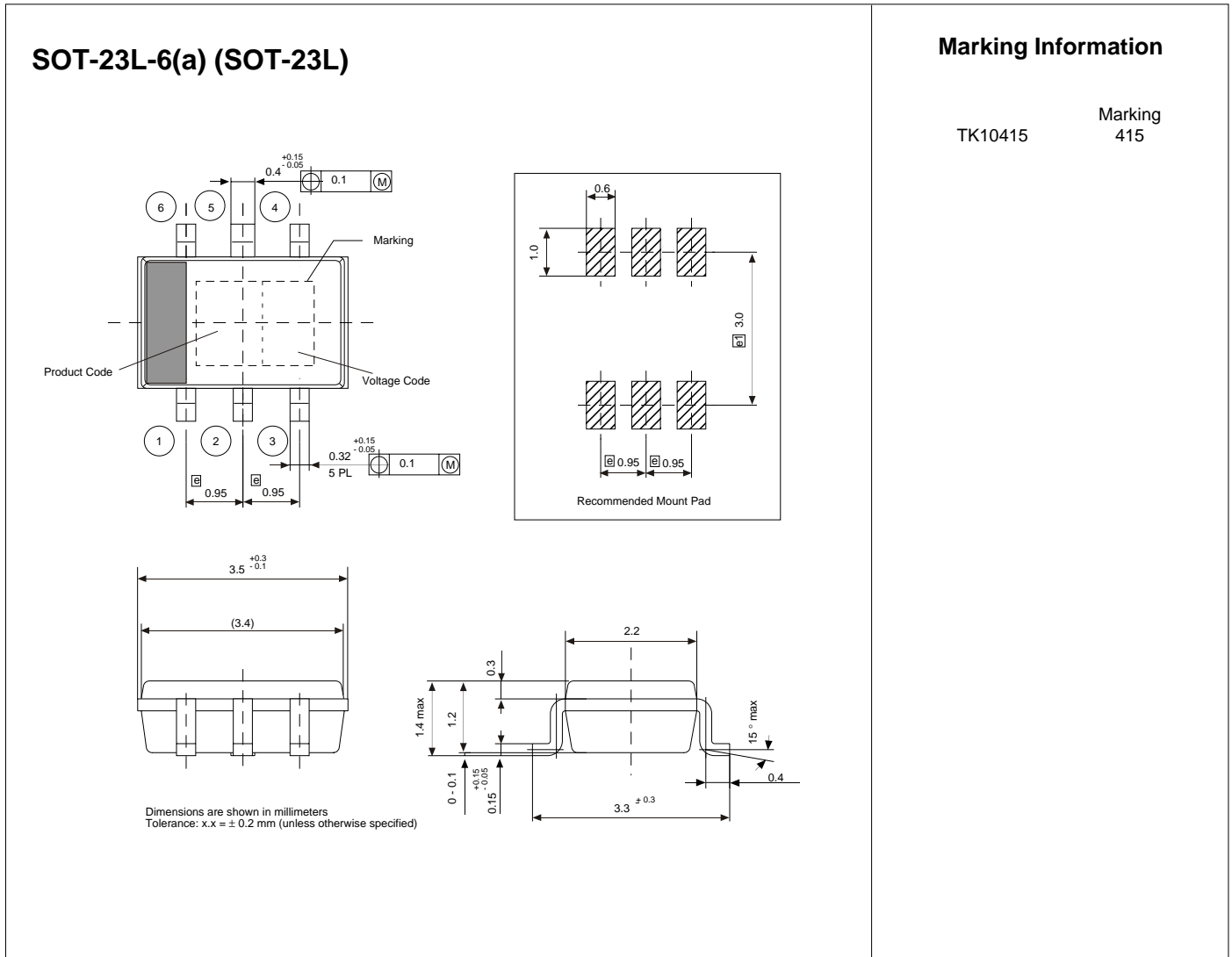
PIN FUNCTION DESCRIPTIONS

PIN NO.	SYMBOL	TERMINAL VOLTAGE (V)	INTERNAL EQUIVALENT CIRCUIT	DESCRIPTION
1	V_{OUT1}	$1/2 V_{CC}$		A1 amplifier output terminal
2	V_{CC}	V_{CC}	—	Supply input terminal
3	V_{OUT2}	$1/2 V_{CC}$		A2 amplifier output terminal
4	V_{ref}	$1/2 V_{CC}$		Reference voltage terminal. When this terminal is V_{CC} , the device is in the standby mode and the supply current is down to under $0.1 \mu A$.
5	GND	0 V		Ground terminal.
6	V_{IN}	$1/2 V_{CC}$		A1 amplifier input terminal.

NOTES

NOTES

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