

# CAMBRIDGE ELECTRONICS LABORATORIES

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===Preliminary July 22, 2004===

BLACK MAGIC TELEPHONE RINGING GENERATOR--LOW-POWER SINE WAVE MODEL LR 12 Vin

**This model's output replicates a reference input waveform with a gain of 24.**

=====OPERATING CHARACTERISTICS=====

Specification	-----Value-----	Remark
Input voltage ( $V_{dc}$ ) >INPUT NOT PROTECTED AGAINST REVERSE POLARITY<	12	Operate: 11.5-12.5 V (reduced output below 12 V)
Idle current (mA)	150	
Drive reference ( $\pm V_{p-p}$ )	5	Drives to rated rms output
Drive input impedance ( $\Omega$ )	10,000	
Output voltage ( $V_{rms}$ )	-----86-----	At $\pm 5$ V p-p drive; custom values available to 105 $V_{rms}$
Output power (W)	5	Intermittent duty = 5 REN
Load regulation (%)	----- $\pm 4$ -----	
Efficiency (%)	~42/~46/~55	At loads 1 W/3 W/5 W
Operating temp. ( $^{\circ}$ C)	-10-->+70	Wider temperature range available on special order
Storage temp. ( $^{\circ}$ C)	-10-->+85	
Hi-pot test ( $V_{dc}$ )	2,000	Input-->output

=====NOTES=====

- (1) Device part number LR12vvv where vvv is (for a sine wave) the rms output voltage produced by a  $\pm 5 V_{p-p}$  drive reference.
- (2) All materials UL-rated 94V-0
- (3) Output is *NOT PROTECTED* against shorts; circuit must have series resistance of at least 300  $\Omega$ , normally part of ring trip circuit. If the latter's current sensing resistor is less than 300 $\Omega$ , additional resistance must be added. Output is protected against transient overvoltages by internal zener clamp. Conditioning may be required for highly inductive loads.
- (4) Output will pass d.c. ring trip bias only when unit is powered.
- (5) Device is intended for intermittent duty and should be powered only when ringing.
- (6) The drive is referenced to the COM output terminal, which will ordinarily be connected to the system ground, in which case it cannot be d.c.-biased as usually done to effect ring-trip. Two alternative ring-trip implementations are to use a zener diode instead of d.c. bias, or to insert the d.c. bias in the return lead. See *Telecom Design Tricks*, downloadable from <<http://www.camblab.com>>, Figures 10a and 20, and the LR application note available also from this site.

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BLACK MAGIC TELEPHONE RINGING GENERATOR--LOW-POWER SINE WAVE MODEL LR 12 Vin  
 PHYSICAL CHARACTERISTICS AND MECHANICAL SPECIFICATIONS

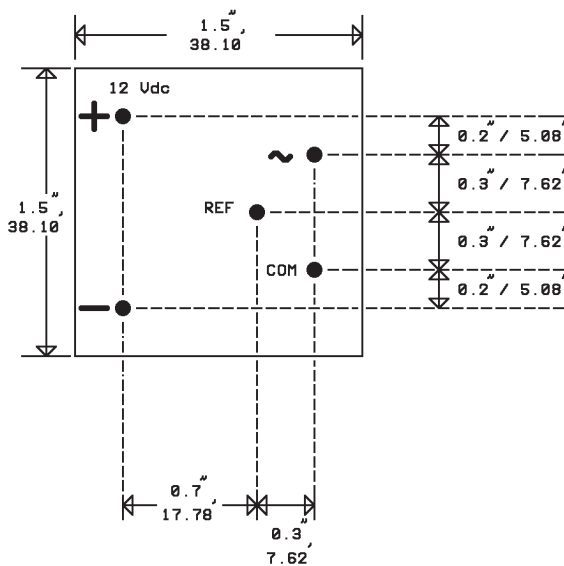
=====PHYSICAL CHARACTERISTICS=====

Dimensions mm (in)

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Dimensions			Terminal spacing		
Height	12.7	(0.50)	Output	15.24	(0.6)
Width	38.1	(1.50)	Input	25.40	(1.0)
Length	38.1	(1.50)	=====		
=====			Weight:	40 grams (1.4 oz)	

=====MECHANICAL SPECIFICATIONS=====

(bottom view)



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=====CONSTRUCTION AND MOUNTING=====

Black Magic ringing generators are monolithically encapsulated in water-proof UL 94V-0 epoxy with terminals as 0.025 inch square pins. Units are intended for direct solder-down to pcb or they may be socketed with receptacles e.g. any receptacle using Mill-Max clips #16 or #47.