

CS52-05D12-31-1

Rev. 3-2026
RoHS3 & REACH
Square Speakers



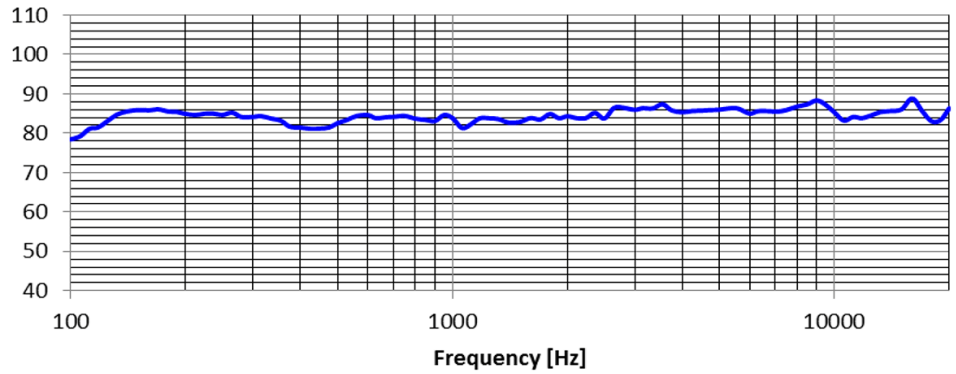
Operating Characteristics

ELECTRICAL

Rated Power	5 W
Short Term Max Power	8 W
Impedance	4 Ω ± 15 % 1000 Hz; 1 W

ACOUSTIC: Baffle Board

f_0	120 Hz ± 20 % 1 W
Freq. Range	96 to 20000 Hz
Rated SPL	82 ± 3 dB 2000 - 4000 Hz; AVG; 1 W; 100 cm
Distortion	Max 5 % 1000 Hz; 1 W



Physical Characteristics

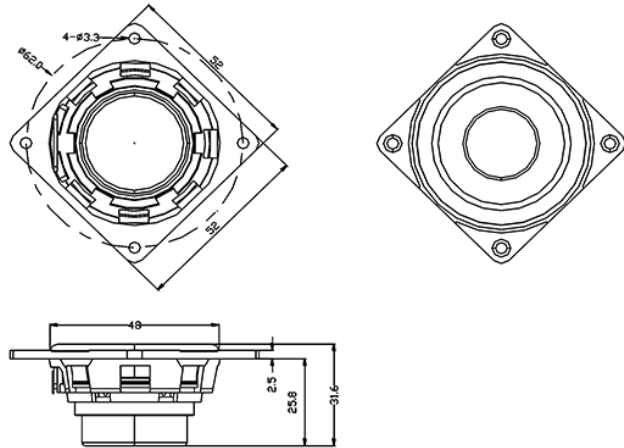
MATERIALS

Housing	ABS
Cone	PU + Paper
Magnet	NdFeB
Solder Tabs	Paper + Tin Plated Iron

TEMPERATURE RANGES

Operating	-20 to +60 °C
Storage	-25 to +70 °C

Weight 70 g



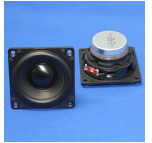
General tolerance = ±0.3 mm and all measurements in mm unless otherwise noted.

Revision	Description	By	Date
2-2024	Updated frequency range.	SK	2024-02-22
3-2026	Updated to include TS Parameters and XMAX value.	KG	2026-04-05

Warranty: For a period of one (1) year from date of shipping under normal operations conditions. This warranty does not apply to products damaged through misuse, abuse, improper installation, alteration, rework, or attempt to repair.

The information contained herein is believed to be correct, but no guarantee or warranty, express or implied, with respect to accuracy, completeness or results is extended and no liability is assumed. Challenge Electronics reserves the right to make changes in any specification, data or material contained herein.

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Thiele Small Parameters

Electrical Parameters	Value	Unit	Description
R_e	3.69	Ohm	electrical voice coil resistance at DC
L_e	0.078	mH	frequency independent part of voice coil inductance
L_2	0.049	mH	para-inductance of voice coil
R_2	1.46	Ohm	electrical resistance due to eddy current losses
C_{mes}	217.84	μ F	electrical capacitance representing moving mass
L_{ces}	10.63	mH	electrical inductance representing driver compliance
R_{es}	24.28	Ohm	resistance due to mechanical losses
f_s	104.6	Hz	driver resonance frequency
Mechanical Parameters	Value	Unit	Description
M_{ms}	1.097	g	mechanical mass of driver diaphragm assembly including air load and voice coil
$M_{md} (S_d)$	1.03	g	mechanical mass of voice coil and diaphragm without air load
R_{ms}	0.208	kg/s	mechanical resistance of total-driver losses
C_{ms}	2.11	mm/N	mechanical compliance of driver suspension
K_{ms}	0.47	N/mm	mechanical stiffness of driver suspension
Bl	2.244	N/A	force factor (Bl product)
λ_s	0.152	N/A	suspension creep factor
Loss Factors	Value	Unit	Description
Q_{tp}	0.459	N/A	total Q-factor considering all losses
Q_{ms}	3.475	N/A	mechanical Q-factor of driver in free air considering R_{ms} only
Q_{es}	0.528	N/A	electrical Q-factor of driver in free air considering R_e only
Q_{ts}	0.459	N/A	total Q-factor considering R_e and R_{ms} only
Other Parameters	Value	Unit	Description
V_{as}	0.6904	l	equivalent air volume of suspension
η_0	0.144	%	reference efficiency (2 pi-radiation using R_e)
L_m	83.78	dB	characteristic sound pressure level (SPL at 1m for 1W @ R_e)
L_{nom}	84.13	dB	nominal sensitivity (SPL at 1m for 1W @ Z_n)
$rmse_Z$	5.34	%	root-mean-square fitting error of driver impedance $Z(f)$
$rmse_{Hx}$	3.13	%	root-mean-square fitting error of transfer function $H_x(f)$
Series resistor	0	Ohm	resistance of series resistor
S_d	15.21	cm ²	diaphragm area
X_{MAX}	4	mm	maximum one-way linear excursion of a speaker cone before distortion increases

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