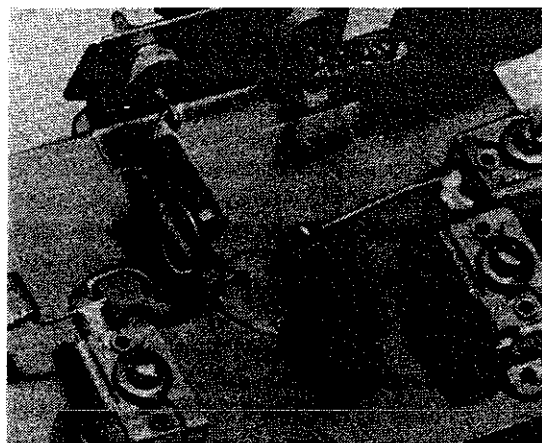
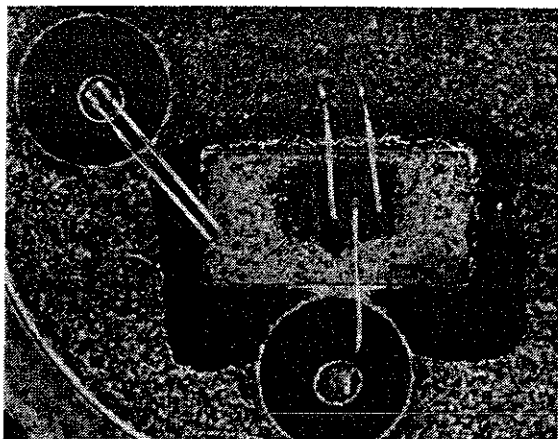
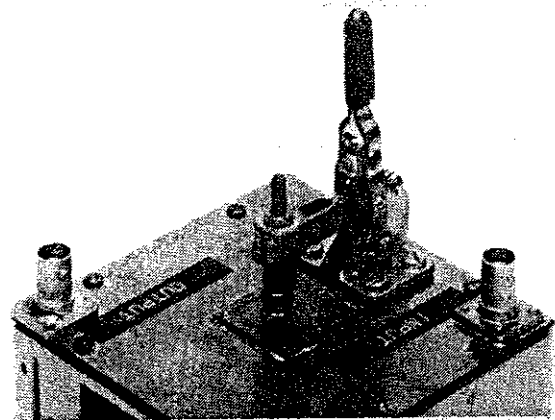
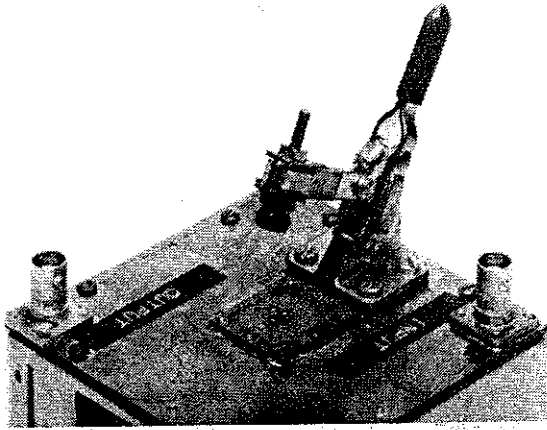


The Common Emitter TO-39 And Its Advantages



The common emitter TO-39 package is one of Motorola's latest innovations in low-cost rf packages. It differs from conventional TO-39's or TO-5's in that the emitter, not the collector, is connected to the metal case. To achieve this, a BeO insulating block metallized on top and bottom is brazed to the can bottom and the transistor chip. Wires are then bonded from the chip and insulator block to the terminals and the can bottom as shown in the photo. With NPN transistors, this configuration permits direct connection of the can to rf and negative dc ground for many class B and C circuits.

Two important advantages can be derived from the common emitter TO-39: By connecting the case to the rf circuit ground, emitter inductance is reduced and gain increased by 3 to 5 dB over that of comparable, conventionally wired transistors. And the case may be directly pressed, clipped, or soldered to the heat sink with no effect on rf performance. This feature may eliminate the need for the heat radiating "coolers" because soldering the transistor bottom to the circuit, typically a PC board, improves dissipation by removing heat through the thick metal base rather than the thin can.



Fixture for Functional Testing of the Common Emitter TO-39

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.02	9.30	0.355	0.366
B	8.00	8.51	0.315	0.335
C	4.19	4.57	0.165	0.180
D	0.43	0.53	0.017	0.021
E	0.43	0.89	0.017	0.035
F	0.41	0.48	0.016	0.019
G	4.83	5.33	0.190	0.210
H	0.71	0.86	0.028	0.034
J	0.74	1.02	0.029	0.040
K	12.70	—	0.500	—
M	45° NOM	—	45° NOM	—
N	2.54 TYP	—	0.100 TYP	—
Q	90° NOM	—	90° NOM	—

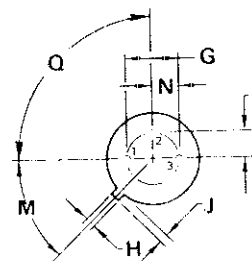
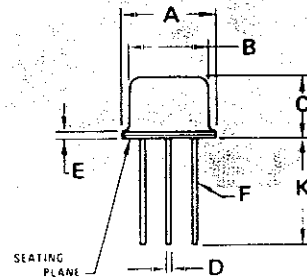
All JEDEC dimensions and notes apply

CASE 79-03
TO-39

ISSUE "H" (4-24-74)

For example, the MRF227 was mounted in this manner and a θ_{jc} of 15°C/W was measured using a Barnes RM-2A Infrared Microscope. Compared to an MRF607 in a conventional package operating under identical conditions, this is greater than a 2:1 reduction in thermal resistance. And as side benefits, the lower θ_{jc} also reduces power slump and improves reliability.

In many mobile radios CE-TO39 devices can replace stud or flange mounted stripline parts used for 1- to 4-watt drivers. This conversion should normally offer a significant savings in the cost of parts as well as the costs of mounting hardware and labor.



STYLE 5
PIN 1 COLLECTOR
PIN 2 BASE
PIN 3 EMITTER

The designer of compact handheld radio equipment will find the CE-TO39 offers a real advantage from the elimination of interstage RFI or coupling because the can is at rf ground. Stability is usually improved and the higher available gain may reduce the number of transmitter stages. Simplified and improved cooling may also be obtained by connecting the can directly to the radio housing or chassis.

To sum it up: The emitter-to-can wired IO-39 known as the CE-TO39 offers the designer significant improvements in both gain and thermal performance. Because of its price, compared to SOE and IO-60 packages, the designer can use the CE-IO39 to reduce costs. And he can make his design easier to assemble with no loss in rf performance.