



COMPONENT NEWS

PREPRODUCTION ENGINEERING

NOT TO BE DUPLICATED OR CIRCULATED OUTSIDE OF TEKTRONIX, INC.

SEND INFORMATION, COMMENTS OR REQUESTS FOR COPIES TO DEL. STA. 50-440, OR CALL EXT. 272.

COMPILED BY PRODUCT RELIABILITY INFORMATION NO. 99 DATE 2-25-69

MOTOROLA PLASTIC TRANSISTORS

This is an attempt to bring everyone up to date on the present status of *MOTOROLA* "plastics" and the reason for it.

Their original package was a transfer molded epoxy. It passed humidity tests twice as severe as our instruments must withstand but failed more severe tests that *FAIRCHILD* "plastics" passed. We kept them out of environmentalized instruments for that reason.

They changed the package material to phenolic which would pass a pressure cooker test but failed high temperature, high humidity, reverse bias test. In early 1967, they coated the chip with a soft silicone. At the same time they cured a die bonding problem that was causing high thermal resistance and current crowding in the chip to header attachment. By the end of March 1967, all of their "plastics" were made the new way and by midyear we were receiving only the new type. We have purchased about 200,000 uncoated 2N3904's (151-0190-00) and about 500,000 coated 2N3904's. The proportion for the other plastic part numbers purchased from *MOTOROLA* are similar.

Failures received to date have been limited to uncoated units only and the common failure mode is an open base. Failed coated units are very rarely received and the failure mode is random. The uncoated ones have failed in low power, low humidity environments as well as in environments such as encountered in Florida. The reason for failure of the uncoated units is believed to be ammonia in the phenolic attacking the metalization. The coating prevents direct contact between phenolic and chip and seems to have cured the problem.

Our first AGREE tests of digital systems using uncoated units required from 2000 to 4000 hours to render a large number of failures. We have had coated units in the field now for at least one and a half years and the conspicuous lack of failures is very encouraging, supporting the results of our test.

To increase customer confidence in our digital instruments we removed the *MOTOROLA* "plastics", even though we feel that they are okay now, and substituted *FAIRCHILD* and *CONTINENTAL DEVICE* "plastics" plus some metal can types.

We are running AGREE tests on systems, using *MOTOROLA*, *FAIRCHILD*, and *CONTINENTAL DEVICE* "plastics" each in a separate system for comparison under identical conditions. At the end of 3000 hours they all looked good. If we can continue to spare the manpower, we will go to 5000 hours. In the meantime, we are assuming that current *MOTOROLA* "plastics" are okay.

For further information, contact me at Ext 7709.

-Virg Tomlin

INSTRUMENTS IN THE INSTRUMENT CONTROL LOANER POOL

A list of all instruments in the Instrument Control Loaner Pool is being compiled and will be distributed in the near future.

One instrument which may be worthy of special mention is the *HONEYWELL* 4881 Transient Generator. This instrument will provide variable amplitude, high power transients for series insertion with AC loads and parallel insertion with DC loads enabling the user to determine the effects and susceptibility of power line transients on equipment under test. The 4881 can be triggered by a variable internal oscillator, manually, or in sync with the input power line frequency (48-72 Hz or 320-480 Hz).

Specifications include: Pulse rep rate, continuously variable from 0.5 to 500 P/S; pulse amplitude, continuously variable between 0.1 and 250 volts; peak pulse power, 33 kW into 0.5Ω load at 60 P/S; pulse shape, $0.5\ \mu\text{s}$ rise time falling to 0 volts in $10\ \mu\text{s}$ per MIL-STD-826; synchronous pulse position 0° to 360° or power line wave form; output impedance 0.5Ω nominal. Complete specs, instruction manual and the instrument are available in Instrument Control 50-153.

For more information, call Ext 7141.

-Ray Barrett