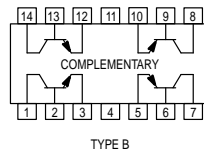


# Quad Complementary Pair Transistor

## NPN/PNP Silicon



## MPQ6700

**MPQ6501, MPQ6502**

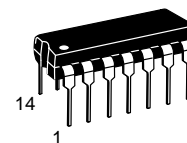
For Specifications,  
See MPQ6001 Data

**MPQ6600A1**

For Specifications,  
See MPQ6100A Data

**Voltage and current are  
negative for PNP transistors**

Motorola Preferred Device



**CASE 646-06, STYLE 1  
TO-116  
TYPE B**

### MAXIMUM RATINGS

| Rating  | Symbol         | Value                  | Unit                                |
|---|----------------|------------------------|-------------------------------------|
| Collector–Emitter Voltage   | $V_{CEO}$      | 40                     | Vdc                                 |
| Collector–Base Voltage  | $V_{CBO}$      | 40                     | Vdc                                 |
| Emitter–Base Voltage  | $V_{EBO}$      | 5.0                    | Vdc                                 |
| Collector Current — Continuous  | $I_C$          | 200                    | mA                                  |
|   |                | <b>Each Transistor</b> | <b>Four Transistors Equal Power</b> |
| Total Device Dissipation<br>@ $T_A = 25^\circ\text{C}$ (1)<br>Derate above $25^\circ\text{C}$ | $P_D$          | 500<br>4.0             | mW<br>mW/ $^\circ\text{C}$          |
| Total Device Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$     | $P_D$          | 825<br>6.7             | mW<br>mW/ $^\circ\text{C}$          |
| Operating and Storage Junction<br>Temperature Range   | $T_J, T_{stg}$ | –55 to +150            | $^\circ\text{C}$                    |

### THERMAL CHARACTERISTICS

| Characteristic     | Junction to<br>Case              | Junction to<br>Ambient | Unit                                     |
|--------------------|----------------------------------|------------------------|--|
| Thermal Resistance | Each Die<br>Effective, 4 Die     | 151<br>52              | $^\circ\text{C/W}$<br>$^\circ\text{C/W}$ |
| Coupling Factors   | Q1–Q4 or Q2–Q3<br>Q1–Q2 or Q3–Q4 | 34<br>2.0              | %<br>%                                   |

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

### OFF CHARACTERISTICS

|  |               |     |    |     |
|--|---------------|-----|----|-----|
| Collector–Emitter Breakdown Voltage(2)<br>( $I_C = 10 \text{ mA}$ , $I_E = 0$ )    | $V_{(BR)CEO}$ | 40  | —  | Vdc |
| Collector–Base Breakdown Voltage<br>( $I_C = 10 \text{ }\mu\text{A}$ , $I_E = 0$ ) | $V_{(BR)CBO}$ | 40  | —  | Vdc |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10 \text{ }\mu\text{A}$ , $I_C = 0$ )   | $V_{(BR)EBO}$ | 5.0 | —  | Vdc |
| Collector Cutoff Current<br>( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )              | $I_{CBO}$     | —   | 50 | nA  |
| Emitter Cutoff Current<br>( $V_{EB} = 4.0 \text{ Vdc}$ , $I_C = 0$ )               | $I_{EBO}$     | —   | 50 | nA  |

- Second Breakdown occurs at power levels greater than 3 times the power dissipation rating.
- Pulse Test: Pulse Width  $\leq 300 \text{ }\mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

Preferred devices are Motorola recommended choices for future use and best overall value.

**MPQ6700****ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

| Characteristic  | Symbol        | Min            | Max         | Unit |
|---|---------------|----------------|-------------|------|
| <b>ON CHARACTERISTICS<sup>(2)</sup></b>   |               |                |             |      |
| DC Current Gain<br>( $I_C = 0.1\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )<br>( $I_C = 1.0\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )<br>( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) | $h_{FE}$      | 30<br>50<br>70 | —<br>—<br>— | —    |
| Collector–Emitter Saturation Voltage<br>( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ )  | $V_{CE(sat)}$ | —              | 0.25        | Vdc  |
| Base–Emitter Saturation Voltage<br>( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ )   | $V_{BE(sat)}$ | —              | 0.9         | Vdc  |
| <b>SMALL–SIGNAL CHARACTERISTICS</b>   |               |                |             |      |
| Current–Gain — Bandwidth Product <sup>(2)</sup><br>( $I_C = 10\text{ mAdc}$ , $V_{CE} = 20\text{ Vdc}$ , $f = 100\text{ MHz}$ )   | $f_T$         | 200            | —           | MHz  |
| Output Capacitance<br>( $V_{CB} = 5.0\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )  | $C_{obo}$     | —              | 4.5         | pF   |
| Input Capacitance<br>( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )   | $C_{ibo}$     | —<br>—         | 10<br>8.0   | pF   |

2. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

## NPN

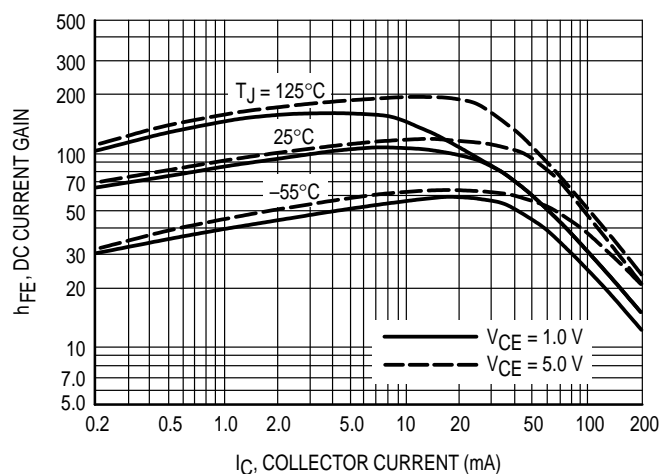


Figure 1. DC Current Gain

## PNP

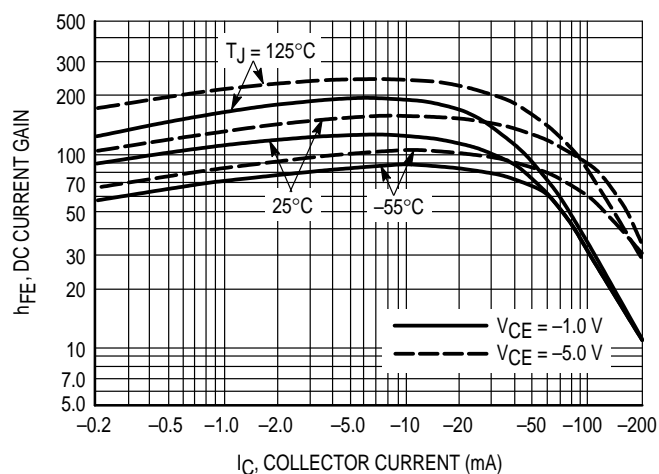


Figure 2. DC Current Gain

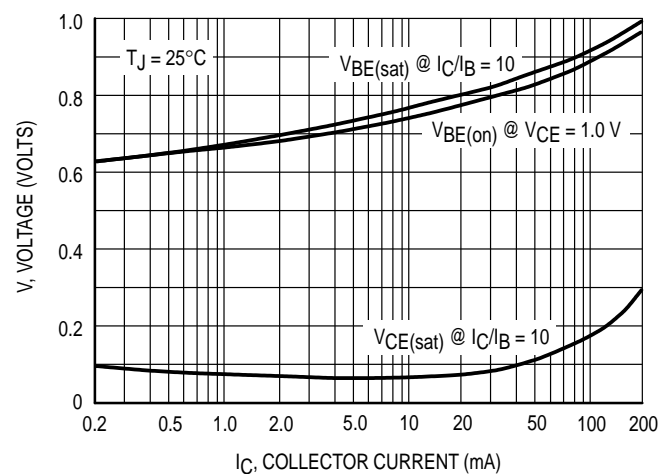


Figure 3. "ON" Voltage

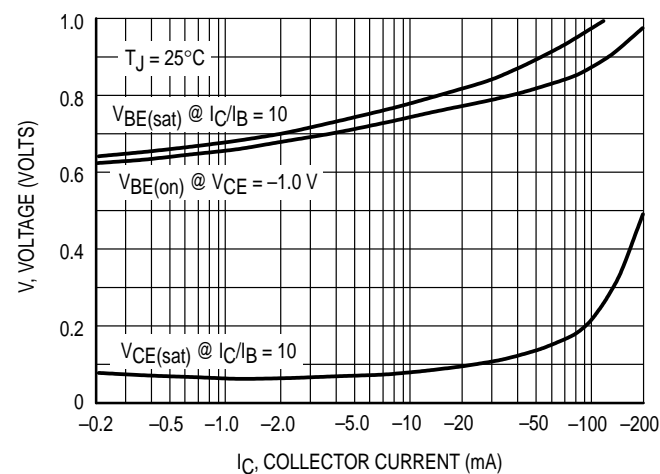


Figure 4. "ON" Voltage

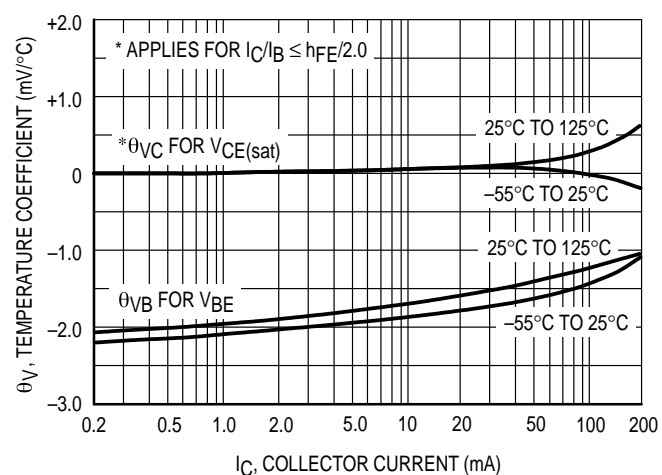


Figure 5. Temperature Coefficients

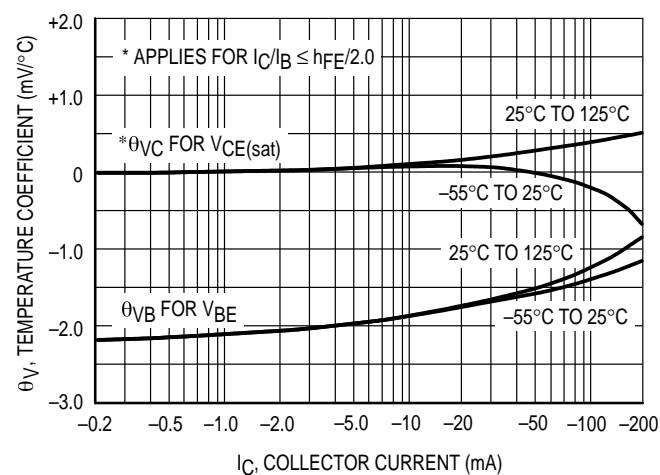


Figure 6. Temperature Coefficients

## NPN

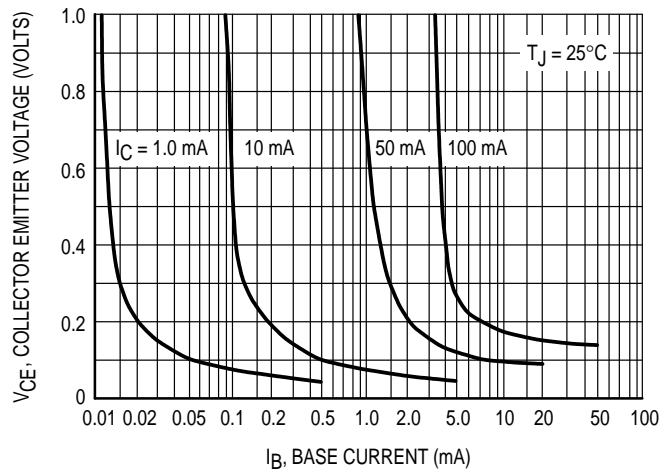


Figure 7. Collector Saturation Region

## PNP

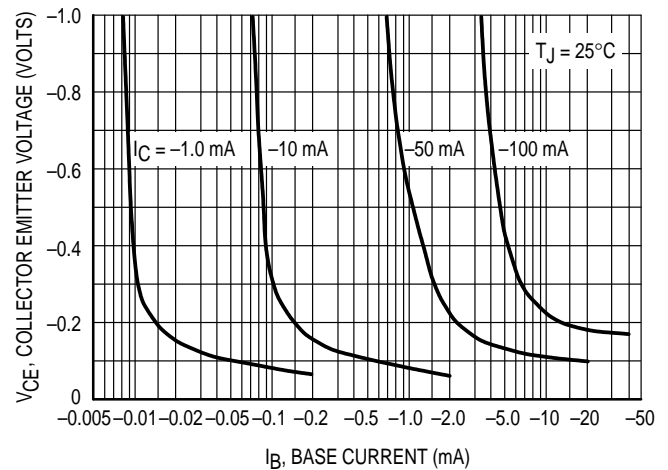


Figure 8. Collector Saturation Region

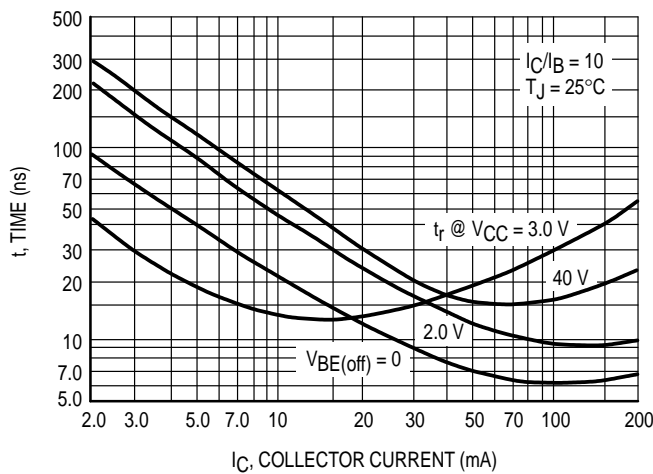


Figure 9. Turn-On Time

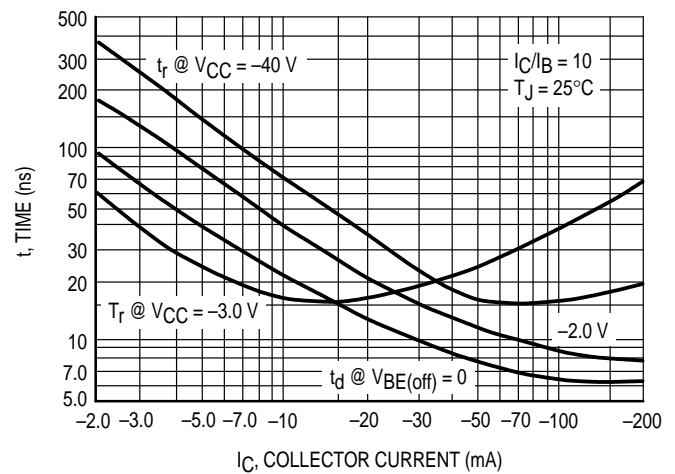


Figure 10. Turn-On Time

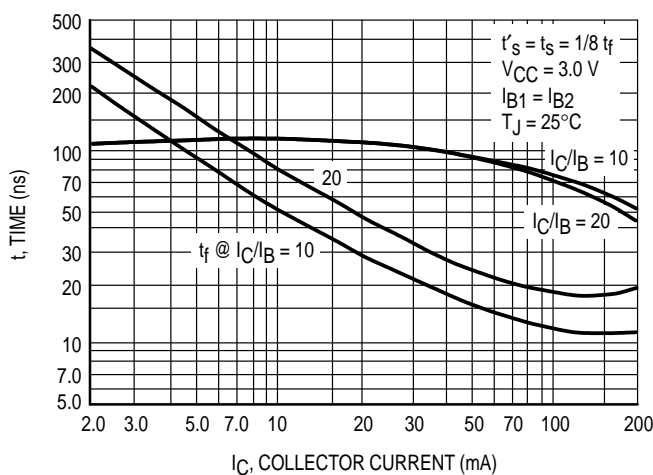


Figure 11. Turn-Off Time

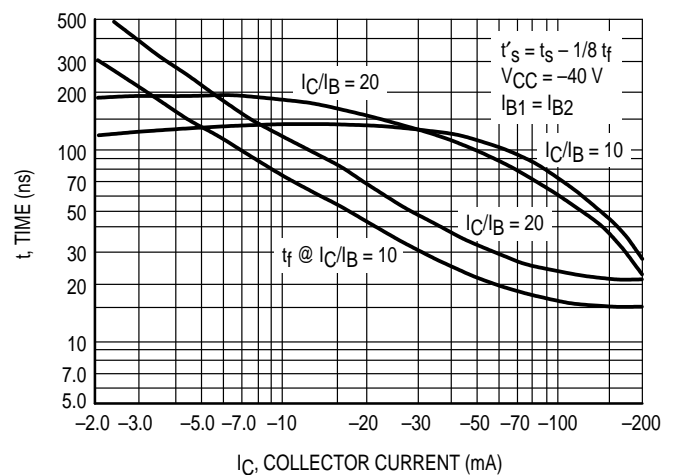


Figure 12. Turn-Off Time

NPN

PNP

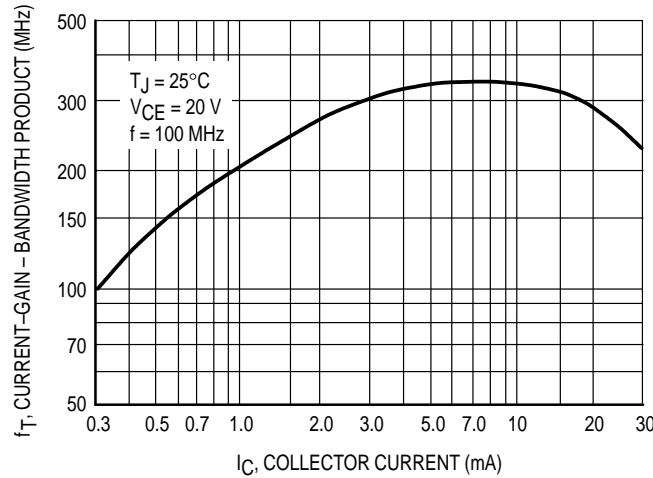


Figure 13. Current-Gain — Bandwidth Product

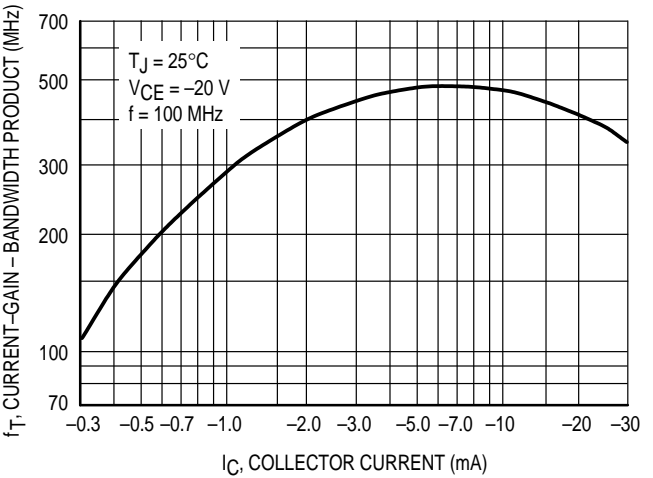


Figure 14. Current-Gain — Bandwidth Product

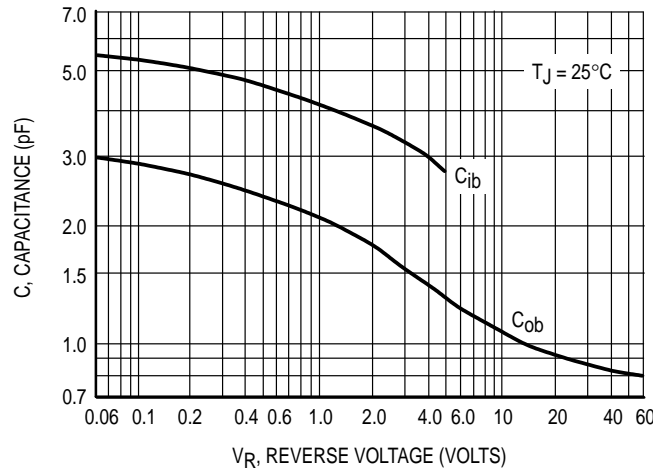


Figure 15. Capacitance

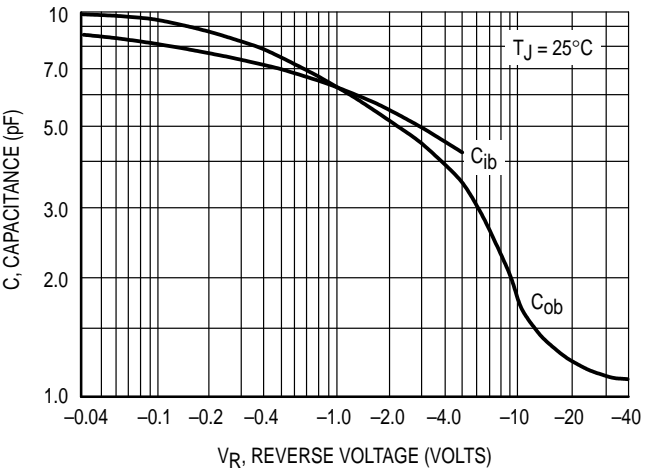
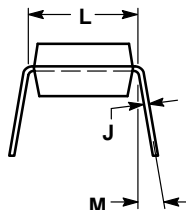
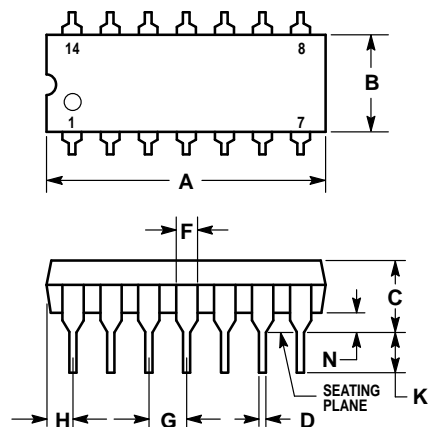


Figure 16. Capacitance

## PACKAGE DIMENSIONS



## STYLE 1:


- PIN 1. COLLECTOR  
 2. BASE  
 3. EMITTER  
 4. NO CONNECTION  
 5. EMITTER  
 6. BASE  
 7. COLLECTOR  
 8. COLLECTOR  
 9. BASE  
 10. EMITTER  
 11. NO CONNECTION  
 12. EMITTER  
 13. BASE  
 14. COLLECTOR

## NOTES:

- LEADS WITHIN 0.13 (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
- DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
- DIMENSION B DOES NOT INCLUDE MOLD FLASH.
- ROUNDED CORNERS OPTIONAL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.715     | 0.770 | 18.16       | 19.56 |
| B   | 0.240     | 0.260 | 6.10        | 6.60  |
| C   | 0.145     | 0.185 | 3.69        | 4.69  |
| D   | 0.015     | 0.021 | 0.38        | 0.53  |
| F   | 0.040     | 0.070 | 1.02        | 1.78  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.052     | 0.095 | 1.32        | 2.41  |
| J   | 0.008     | 0.015 | 0.20        | 0.38  |
| K   | 0.115     | 0.135 | 2.92        | 3.43  |
| L   | 0.300 BSC |       | 7.62 BSC    |       |
| M   | 0°        | 10°   | 0°          | 10°   |
| N   | 0.015     | 0.039 | 0.39        | 1.01  |

**CASE 646-06  
 TO-116  
 ISSUE M**

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