

ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

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| BUV21N | | BUV21 | 3-447 | BUX43 | | BUX13 | 3-484 |
| BUV22 | BUV22 | | 3-453 | BUX47 | BUX47 | | 3-499 |
| BUV23 | BUV23 | | 3-456 | BUX47A | BUX47A | | 3-499 |
| BUV24 | | BUS98 | 3-386 | BUX48 | BUX48 | | 3-506 |
| BUV25 | | BUS98A | 3-386 | BUX48A | BUX48A | | 3-506 |
| BUV44 | BUX47 | | 3-499 | BUX48S | BUX48 | | 3-506 |
| BUV45 | BUX47A | | 3-499 | BUX66 | 2N6211 | | 3-161 |
| BUV46 | 2N6543 | | 3-215 | BUX66A | 2N6212 | | 3-161 |
| BUV47 | BUV47 | | 3-462 | BUX66B | 2N6212 | | 3-161 |
| BUV47A | BUV47A | | 3-462 | BUX66C | 2N6213 | | 3-161 |
| BUV48 | BUV48 | | 3-469 | BUX67 | 2N3584 | | 3-20 |
| BUV48A | BUV48A | | 3-469 | BUX67A | 2N3584 | | 3-20 |
| BUW11 | BUW11 | | 3-476 | BUX67B | 2N3585 | | 3-20 |
| BUW11A | BUW11A | | 3-476 | BUX67C | 2N4240 | | 3-20 |
| BUW12 | BUW12 | | 3-476 | BUX81 | | MJ13325 | 3-700 |

*Consult Motorola if a direct replacement is necessary.

TABLE 5 — PLASTIC TO-220 (continued)

| I _C Cont Amps Max | V _{CE0(sus)} Volts Min | Device Type | | hFE Min/Max | @ I _C Amp | Resistive Switching | | | f _T MHz Min | P _D (Case) Watts @ 25°C |
|------------------------------------|---------------------------------------|-------------|-------------------|------------------|-------------------------|-----------------------------|-----------------------------|-------------------------|------------------------------|--|
| | | NPN | PNP | | | t _s μs Max | t _f μs Max | @ I _C Amp | | |
| | | | | | | | | | | |
| 7 | 45 | BD795 | BD796 | 25 min | 3 | | | | 3 | 65 |
| | 50 | 2N6290 | 2N6109 | 30/150 | 2.5 | 0.4 typ | 0.15 typ | 3 | 4 | 40 |
| | 60 | BD797 | BD798 | 25 min | 3 | | | | 3 | 65 |
| | 70 | 2N6292 | 2N6107 | 30/150 | 3 | 0.4 typ | 0.15 typ | 3 | 4 | 40 |
| | 80 | BD799 | BD800 | 15 min | 3 | | | | 3 | 65 |
| | 100 | BD801 | BD802 | 15 min | 3 | | | | 3 | 65 |
| | 150 | BU407,D | | 30 min | 1.5 | | 0.75 | 5 | 10 | 60 |
| | 200 | BU406,D | | 30 min | 1.5 | | 0.75 | 5 | 10 | 60 |
| | 375 | BU522## | | 250 min | 2.5 | | | | 7.5 | 75 |
| | 425 | BU522A## | | 250 min | 2.5 | | | | 7.5 | 75 |
| 450 | BU522B## | | 250 min | 2.5 | | | | 7.5 | 75 | |
| 8 | 40 | 2N6386## | | 1k/20k | 3 | | | | 20# | 65 |
| | 45 | BDX53## | BDX54## | 750 min | 3 | | | | 4# | 60 |
| | | BD895## | BD896## | 750 min | 3 | | | | 1# | 70 |
| | | BD895A## | BD896A## | 750 min | 4 | | | | 1# | 70 |
| | 60 | 2N6043## | 2N6040## | 1k/10k | 4 | 1.5 typ | 1.5 typ | 3 | 4# | 75 |
| | | BDX53A## | BDX54A## | 750 min | 3 | | | | 4# | 60 |
| | | BD897## | BD898## | 750 min | 3 | | | | 1# | 70 |
| | | BD897A## | BD898A## | 750 min | 4 | | | | 1# | 70 |
| | | TIP100## | TIP105## | 1k/20k | 3 | 1.5 typ | 1.5 typ | 3 | 4# | 80 |
| | 80 | 2N6044## | 2N6041## | 1k/10k | 4 | 1.5 typ | 1.5 typ | 3 | 4# | 75 |
| | | BDX53B## | BDX54B## | 750 min | 3 | | | | 4# | 60 |
| | | BD899## | BD900## | 750 min | 3 | | | | 1# | 70 |
| | | BD899A## | BD900A## | 750 min | 4 | | | | 1# | 70 |
| | | TIP101## | TIP106## | 1k/20k | 3 | 1.5 typ | 1.5 typ | 3 | 4# | 80 |
| | 100 | 2N6045## | 2N6042## | 1k/10k | 3 | 1.5 typ | 1.5 typ | 3 | 4# | 75 |
| | | BDX53C## | BDX54C## | 750 min | 3 | | | | 4# | 60 |
| | | BD901## | BD902## | 750 min | 3 | | | | 1# | 70 |
| | | TIP102## | TIP107## | 1k/20k | 3 | 1.5 typ | 1.5 typ | 3 | 4# | 80 |
| | 120 | BDX53D## | BDX54D## | 750 min | 3 | | | | 4# | 60 |
| | | MJE15028 | MJE15029 | 20 min | 4 | | | | 30 | 50 |
| 150 | MJE15030 | MJE15031 | 20 min | 4 | | | | 30 | 50 | |
| | BU807## | | 100 min | 5 | 0.55 typ | 0.2 typ | 5 | 60 | 60 | |
| 200 | BU806## | | 100 min | 5 | 0.55 typ | 0.2 typ | 5 | | 60 | |
| 300 | MJE13006 | | 5/30 | 5 | 3 | 0.7 | 5 | 4 | 80 | |
| | MJE5740## | MJE5850 | 200 min 15 min | 4 2 | 8 typ 2 | 2 typ 0.5 | 6 4 | 80 80 | | |
| 350 | MJE5741## | | 200 min 15 min | 4 2 | 8 typ 2 | 2 typ 0.5 | 6 4 | 80 80 | | |
| | MJE5742## | MJE5851 | 200 min 15 min | 4 2 | 8 typ 2 | 2 typ 0.5 | 6 4 | 80 80 | | |
| 400 | MJE5742## | | 200 min | 4 | 8 typ | 2 typ | 6 | 80 | | |
| | MJE13007 | MJE5852 | 5/30 15 min | 5 2 | 3 2 | 0.7 0.5 | 5 4 | 4 80 | | |
| | MJE16080 | | 5 min | 8 | 2 | 0.5 | 5 | 80 | | |
| | MJE16106 | | 6/25 | 8 | 2 typ | 0.1 typ | 5 | 100 | | |
| 450 | MJE16081 | | 5 min | 8 | 2 | 0.5 | 5 | 80 | | |
| 10 | 30 | | D45H1 D45H2 | 20 min 40 min | 4 4 | | | | 50 50 | |
| | | 40 | D44E1## | 1000 min | 5 | 2 typ | 0.5 typ | 10 | 50 | |
| | 45 | BDX33## | BDX34## | 750 min | 4 | | | | 3 | 70 |
| | | BD805 | BD806 | 15 min | 4 | | | | 1.5 | 90 |
| | | D44H5 | D45H4 D45H5 | 20 min 40 min | 4 4 | | | | 50 50 | |
| 60 | BDX33A## | BDX34A## | 750 min | 4 | | | | 3 | 70 | |
| BD807 | BD808 | 15 min | 4 | | | | 1.5 | 90 | | |

I_{hfe} @ 1 MHz, ## Darlington

(continued)

TABLE 12 — POWER DARLINGTONS (continued)

| I _C Cont Amps Max | V _{CEO(sus)} Volts Min | Device Type | | h _{FE} Min/Max | @ I _C Amp | Resistive Switching | | | h _{FE} @ 1 MHz Min | P _D (Case) Watts @ 25°C | Case JEDEC/MOT | | |
|------------------------------------|---------------------------------------|-------------|---------|----------------------------|-------------------------|-----------------------------|-----------------------------|-------------------------|-------------------------------------|--|-------------------|----------------|-------------|
| | | NPN | PNP | | | t _s μs Max | t _f μs Max | @ I _C Amp | | | | | |
| | | | | | | | | | | | | | |
| 8 | 80 | MJ1001 | MJ901 | 1k min | 3 | | | | | 90 | TO-204/1 | | |
| | | TIP101 | TIP106 | 1k/20k | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 80 | TO-220/221A | | |
| | | 2N6044 | 2N6041 | 1k/10k | 4 | 1.5 typ | 1.5 typ | 3 | 4 | 75 | TO-220/221A | | |
| | | 2N6301 | 2N6299 | 750k/18k | 4 | 1.5 typ | 1.5 typ | 4 | 4 | 75 | TO-213A/80 | | |
| | | 2N6056 | 2N6054 | 750k/18k | 4 | 1.5 typ | 1.5 typ | 4 | 4 | 100 | TO-204A/1 | | |
| | | MJE6044 | MJE6041 | 1k/20k | 4 | 1.5 typ | 1.5 typ | 4 | 2 | 75 | TO-225AB/90 | | |
| | | BDX53C | BDX54C | 750 min | 3 | | | | 4 | 60 | TO-220/221A | | |
| | | BD901 | BD902 | 750 min | 3 | | | | 1 | 70 | TO-220/221A | | |
| | 100 | MJE6045 | | | 1k/20k | 4 | 1.5 typ | 1.5 typ | 4 | 2 | 75 | TO-225AB/90 | |
| | | MJD122 | MJD127 | | 1k/12k | 4 | 1.5 typ | 2 typ | 4 | 4 | 20 | TO-252/369A-04 | |
| | | MJF102 | MJF107 | | 3k min | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 35 | —/221C-02 | |
| | | TIP102 | TIP107 | | 1k/20k | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 80 | TO-220/221A | |
| | | 2N6045 | 2N6042 | | 1k/10k | 4 | 1.5 typ | 1.5 typ | 3 | 4 | 75 | TO-220/221A | |
| | | BDX53D | BDX54D | | 750 min | 3 | | | | 4 | 60 | TO-220/221A | |
| 150 | BU807● | | | 100 min | 5 | 0.55 typ | 0.2 typ | 5 | | 60 | TO-220/221A | | |
| 200 | BU806● | | | 100 min | 5 | 0.55 typ | 0.2 typ | 5 | | 60 | TO-220/221A | | |
| 300 | MJE5740 | | | 200/400 | 4 | 8 typ | 2 typ | 6 | | 80 | TO-220/221A | | |
| 350 | MJE5741 | | | 200/400 | 4 | 8 typ | 2 typ | 6 | | 80 | TO-220/221A | | |
| 400 | MJE5742 | | | 200/400 | 4 | 8 typ | 2 typ | 6 | | 80 | TO-220/221A | | |
| 500 | BUT50P● | | | 30 min | 2 | 0.75 typ | 0.1 typ | 5 | | 100 | TO-218/340D | | |
| 1400* | MJ10011 | | | 20 min | 4 | | | | 1 | 4 | 80 | TO-204/1 | |
| 10 | 40 | 2N6383 | 2N6648 | 1k/20k | 5 | | | | | 20 | 100 | TO-204/1 | |
| | | D44E1 | | 1000 min | 5 | 2 typ | 0.5 typ | 10 | | 50 | TO-220/221A | | |
| | 45 | BDX33 | BDX34 | | 750 min | 4 | | | | 3 | 70 | TO-220/221A | |
| | 60 | BDV65 | BDV64 | | 1k min | 5 | | | | | 125 | TO-218/340D | |
| | | BDX33A | BDX34A | | 750 min | 4 | | | | 3 | 70 | TO-220/221A | |
| | | MJ3000 | MJ2500 | | 1k min | 5 | | | | | 150 | TO-204/1 | |
| | | 2N6387 | 2N6667 | | 1k/20k | 5 | | | | 20 | 65 | TO-220/221A | |
| | | 2N6384 | | | 1k/20k | 5 | | | | 20 | 100 | TO-204/1 | |
| | | D44E2 | | | 1000 min | 5 | 2 typ | 0.5 typ | 10 | | 50 | TO-220/221A | |
| | TIP140 | TIP145 | | 500 min | 10 | 2.5 typ | 2.5 typ | 5 | 4 | 125 | TO-218/340 | | |
| | 80 | 2N6388 | 2N6668 | | 1k/20k | 5 | | | | | 20 | 65 | TO-220/221A |
| | | 2N6385 | | | 1k/20k | 5 | | | | | 20 | 100 | TO-204/1 |
| | | BDV65A | BDV64A | | 1k min | 5 | | | | | 125 | TO-218/340D | |
| | | BDX33B | BDX34B | | 750 min | 3 | | | | 3 | 70 | TO-220/221A | |
| | | D44E3 | | | 1000 min | 5 | 2 typ | 0.5 typ | 10 | | 50 | TO-220/221A | |
| | | MJD44E3 | | | 1k min | 5 | 2 typ | 0.5 typ | 10 | | 20 | TO-252/369A-04 | |
| | TIP141 | TIP146 | | 500 min | 10 | 2.5 typ | 2.5 typ | 5 | 4 | 125 | TO-218/340 | | |
| | 100 | BDV65B | BDV64B | | 1k min | 5 | | | | | 125 | TO-218/340D | |
| BDX33C | | BDX34C | | 750 min | 3 | | | | 3 | 70 | TO-220/221A | | |
| TIP142 | | TIP147 | | 500 min | 10 | 2.5 typ | 2.5 typ | 5 | 4 | 125 | TO-218/340 | | |
| 120 | BDV65C | BDV64C | | 1k min | 5 | | | | | 125 | TO-218/340D | | |
| | BDX33D | BDX34D | | 750 min | 3 | | | | 3 | 70 | TO-220/221A | | |
| 200 | BU323P | | | 150 min | 6 | 15 | 15 | 6 | | 125 | TO-218/340D | | |
| 250 | BU323AP | | | 150 min | 6 | 15 | 15 | 6 | | 125 | TO-218/340D | | |
| 350 | BU323 | | | 150 min | 6 | 7.5 typ | 5.2 typ | 6 | | 175 | TO-204/1 | | |
| | MJ10002 | | | 30/300 | 5 | 2.5 | 1 | 5 | 10 | 150 | TO-204/1 | | |
| | MJ10006● | | | 30/300 | 5 | 1.5 | 0.5 | 5 | 10 | 150 | TO-204/1 | | |
| 400 | BU323A | | | 150 min | 6 | 7.5 typ | 5.2 typ | 6 | | 175 | TO-204/1 | | |
| | MJH10012 | | | 100/2k | 6 | 15 | 15 | 6 | | 118 | TO-218/340 | | |
| | MJ10007● | | | 30/300 | 5 | 1.5 | 0.5 | 5 | 10 | 150 | TO-204/1 | | |

● Darlington with speed-up diode.

(continued)

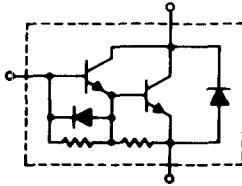
2

BU806
BU807

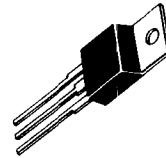
NPN DARLINGTON POWER TRANSISTORS

These Darlington transistors are high voltage, high speed devices for horizontal deflection circuits in TV's and CRT's.

- High Voltage: $V_{CEV} = 330$ or 400 V
- Fast Switching Speed:
 $t_c = 1.0 \mu s$ (max)
- Low Saturation Voltage:
 $V_{CE(sat)} = 1.5$ V (max)
- Packaged in JEDEC TO-220AB
- Damper Diode V_F is specified.
 $V_F = 2.0$ V (max)



8.0 AMPERE
DARLINGTON
NPN POWER
TRANSISTORS
60 WATTS
150 and 200 VOLTS

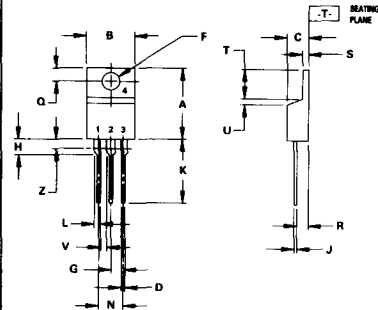


MAXIMUM RATINGS

| Rating | Symbol | BU806 | BU807 | Unit |
|---|----------------------|------------|-------|------------------------|
| Collector-Emitter Voltage | V_{CEO} | 200 | 150 | Vdc |
| Collector-Emitter Voltage | V_{CEV} | 400 | 330 | Vdc |
| Collector-Base Voltage | V_{CBO} | 400 | 330 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 6.0 | | Vdc |
| Collector Current — Continuous | I_C | 8.0 | | Adc |
| Collector Current — Peak | | 15 | | |
| Emitter-Collector Diode Current | I_F | 10 | | Adc |
| Base Current | I_B | 2.0 | | Adc |
| Total Device Dissipation, $T_C = 25^\circ C$ Derate above $T_C = 25^\circ C$ | P_D | 60 | 0.48 | Watts W/ $^\circ C$ |
| Operating and Storage Junction Temperature Range | T_J , T_{stg} | -65 to 150 | | $^\circ C$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|------|--------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 2.08 | $^\circ C/W$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 70 | $^\circ C/W$ |
| Lead Temperature for Soldering Purposes, 1/8" from Case for 5.0 Seconds | T_L | 275 | $^\circ C$ |



NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
 2. CONTROLLING DIMENSION: INCH
 3. DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 14.48 | 15.75 | 0.570 | 0.620 |
| B | 9.66 | 10.28 | 0.380 | 0.405 |
| C | 4.07 | 4.82 | 0.160 | 0.190 |
| D | 0.64 | 0.88 | 0.025 | 0.035 |
| F | 3.61 | 3.73 | 0.142 | 0.147 |
| G | 2.42 | 2.66 | 0.095 | 0.105 |
| H | 2.80 | 3.93 | 0.110 | 0.155 |
| J | 0.46 | 0.71 | 0.018 | 0.028 |
| K | 12.70 | 14.27 | 0.500 | 0.562 |
| L | 1.15 | 1.39 | 0.045 | 0.055 |
| N | 4.83 | 5.33 | 0.190 | 0.210 |
| Q | 2.54 | 3.04 | 0.100 | 0.120 |
| R | 2.04 | 2.79 | 0.080 | 0.110 |
| S | 1.15 | 1.39 | 0.045 | 0.055 |
| T | 5.97 | 6.47 | 0.235 | 0.255 |
| U | 0.90 | 1.27 | 0.035 | 0.050 |
| V | 1.15 | — | 0.045 | — |
| Z | — | 2.04 | — | 0.080 |

STYLE 1:
 PIN 1 BASE
 2 COLLECTOR
 3 EMITTER
 4 COLLECTOR

CASE 221A-04
TO-220AB

BU806, BU807

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------------------------|------------|-----|-----|------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector-Emitter Sustaining Voltage (1) ($I_C = 100\text{ mAdc}$, $I_B = 0$) | BU806 BU807 $V_{CE(sus)}$ | 200 150 | — | — | Vdc |
| Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CBO}$, $V_{BE} = 0$) | I_{CES} | — | — | 100 | μA dc |
| Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CEV}$, $V_{BE(off)} = 6.0\text{ Vdc}$) | I_{CEV} | — | — | 100 | μA dc |
| Emitter Cutoff Current ($V_{EB} = 6.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | — | — | 3.0 | mA |
| ON CHARACTERISTICS (1) | | | | | |
| Collector-Emitter Saturation Voltage ($I_C = 5.0\text{ Adc}$, $I_B = 50\text{ mA}$ dc) | $V_{CE(sat)}$ | — | — | 1.5 | Vdc |
| Base-Emitter Saturation Voltage ($I_C = 5.0\text{ Adc}$, $I_B = 50\text{ mA}$ dc) | $V_{BE(sat)}$ | — | — | 2.4 | Vdc |
| Emitter-Collector Diode Forward Voltage ($I_F = 4.0\text{ Adc}$) | V_F | — | — | 2.0 | Vdc |

SWITCHING CHARACTERISTICS

| | | | | | | |
|--|--|----------|---|------|-----|---------------|
| Turn-On Time | (Resistive Load, $V_{CC} = 100\text{ Vdc}$, $I_C = 5.0\text{ Adc}$, $I_{B1} = 50\text{ mA}$ dc, $I_{B2} = 500\text{ mA}$ dc) | t_{on} | — | 0.35 | — | μs |
| Storage Time | | t_s | — | 0.55 | — | μs |
| Fall Time | | t_f | — | 0.20 | — | μs |
| Crossover Time ($I_C = 5.0\text{ Adc}$, $I_{B1} = 50\text{ mA}$ dc, $V_{BE(off)} = 4.0\text{ Vdc}$, $V_{clamp} = 200\text{ Vdc}$, $L = 500\text{ }\mu\text{H}$) | | t_c | — | 0.40 | 1.0 | μs |

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 1\%$

FIGURE 1 — DC CURRENT GAIN

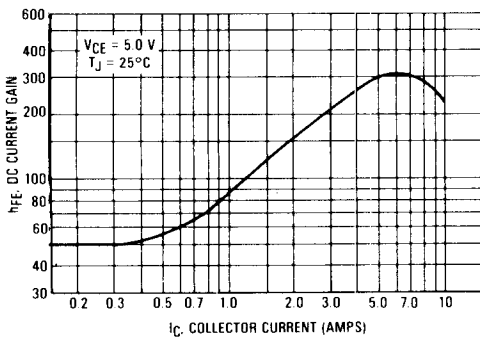


FIGURE 2 — SAFE OPERATING AREA (FBSOA)

