:

Continental Device India Pvt. Limited

An IATF 16949, ISO9001 and ISO 14001 Certified Company

# DARLIGTON COMPLIMENTARY POWER TRANSISTORS

12 Ampere, 80~100Volts, 150 Watts

**NPN 2N6059**
**NPN 2N6058**
**PNP 2N6052**
**PNP 2N6051**

TO-3

**TO-3**
**Metal Can Package**
**RoHS compliant**

## FEATURES:

High DC Cur $H_{fe}$ =3500 (Typ.) @ $I_C$=5.00A DC

Collector–Emitter Sustaining Voltage @ 100 mA

$V_{CEO(SUS)}$ =80 VDC (Min.)--- 2N6058

=100 VDC (Min.)--- 2N6059, 2N6052

Monolithic Construction with Built–In Base–Emitter Shunt Resistors

**APPLICATIONS:** General–purpose amplifier and low frequency switching applications.

## ABSOLUTE MAXIMUM RATINGS ($T_a$ = 25 °C)

| Rating | Symbol | 2N6051 2N6058 | 2N6052 2N6059 | Unit |
|---|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | 80 | 100 | Vdc |
| Collector–Base Voltage | $V_{CB}$ | 80 | 100 | Vdc |
| Emitter–Base voltage | $V_{EB}$ | 5.0 | | Vdc |
| Collector Current — Continuous<br>Peak | $I_C$ | 12<br>20 | | Adc |
| Base Current | $I_B$ | 0.2 | | Adc |
| Total Device Dissipation @$T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 150<br>0.857 | | Watts<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | −65 to +200°C | | °C |

## THERMAL CHARACTERISTICS

| Characteristic | Symbol | Rating | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{JC}$ | 1.17 | °C/W |

(1) Indicates JEDEC Registered Data.

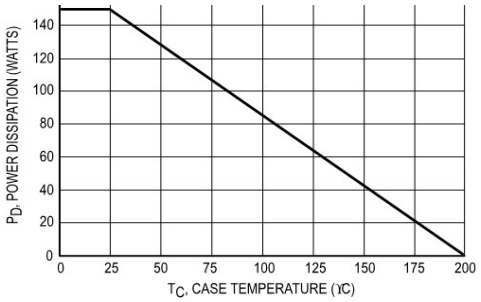


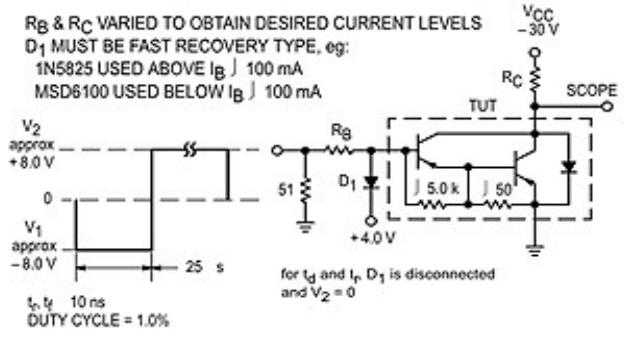

**Figure 1. Power Derating**

2N6058_59,2N6051_52
Rev0_30042020EM

## ELECTRICAL CHARACTERISTICS ($T_A$=25 ° C unless otherwise specified)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector–Emitter Sustaining Voltage (1) ($I_C$ = 100 mAdc, $I_B$ = 0) | 2N6051, 2N6058<br>2N6052, 2N6059 | $V_{CEO(sus)}$ | 80<br>100 | —<br>— | Vdc |
| Collector Cutoff Current ($V_{CE}$ = 40 Vdc, $I_B$ = 0)<br>($V_{CE}$ = 50 Vdc, $I_B$ = 0) | 2N6051, 2N6058<br>2N6052, 2N6059 | $I_{CEO}$ | —<br>— | 1.0<br>1.0 | mAdc |
| Collector Cutoff Current ($V_{CE}$ = Rated $V_{CEO}$, $V_{BE(off)}$ = 1.5 Vdc)<br>($V_{CE}$ = Rated $V_{CEO}$, $V_{BE(off)}$ = 1.5 Vdc, $T_C$ = 150°C) | | $I_{CEX}$ | — | 0.5<br>5.0 | mAdc |
| Emitter Cutoff Current ($V_{BE}$ = 5.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | — | 2.0 | mAdc |
| **ON CHARACTERISTICS (1)** | | | | | |
| DC Current Gain ($I_C$ = 6.0 Adc, $V_{CE}$ = 3.0 Vdc)<br>($I_C$ = 12 Adc, $V_{CE}$ = 3.0 Vdc) | | $h_{FE}$ | 750<br>100 | 18,000<br>— | — |
| Collector–Emitter Saturation Voltage ($I_C$ = 6.0 Adc, $I_B$ = 24 mAdc)<br>($I_C$ = 12 Adc, $I_B$ = 120 mAdc) | | $V_{CE(sat)}$ | —<br>— | 2.0<br>3.0 | Vdc |
| Base–Emitter Saturation Voltage ($I_C$ = 12 Adc, $I_B$ = 120 mAdc) | | $V_{BE(sat)}$ | — | 4.0 | Vdc |
| Base–Emitter On Voltage ($I_C$ = 6.0 Adc, $V_{CE}$ = 3.0 Vdc) | | $V_{BE(on)}$ | — | 2.8 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Magnitude of Common Emitter Small–Signal Short Circuit Forward Current Transfer Ratio ($I_C$ = 5.0 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 MHz) | | $\|h_{fe}\|$ | 4.0 | — | MHz |
| Output Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 0.1 MHz) | 2N6051, 2N6052<br>2N6058/2N6059 | $C_{ob}$ | —<br>— | 500<br>300 | pF |
| Small–Signal Current Gain ($I_C$ = 5.0 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 kHz) | | $h_{fe}$ | 300 | — | — |

* Indicates JEDEC Registered Data.
(1) Pulse test: Pulse Width = 300 s, Duty Cycle = 2.0%.




For NPN test circuit reverse diode and voltage polarities.

**Figure 2. Switching Times Test Circuit**

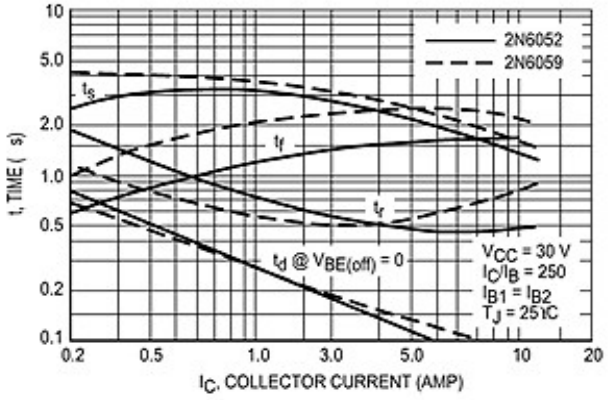



**Figure 3. Switching Times**

## TYPICAL CHARACTEISTICS CURVES

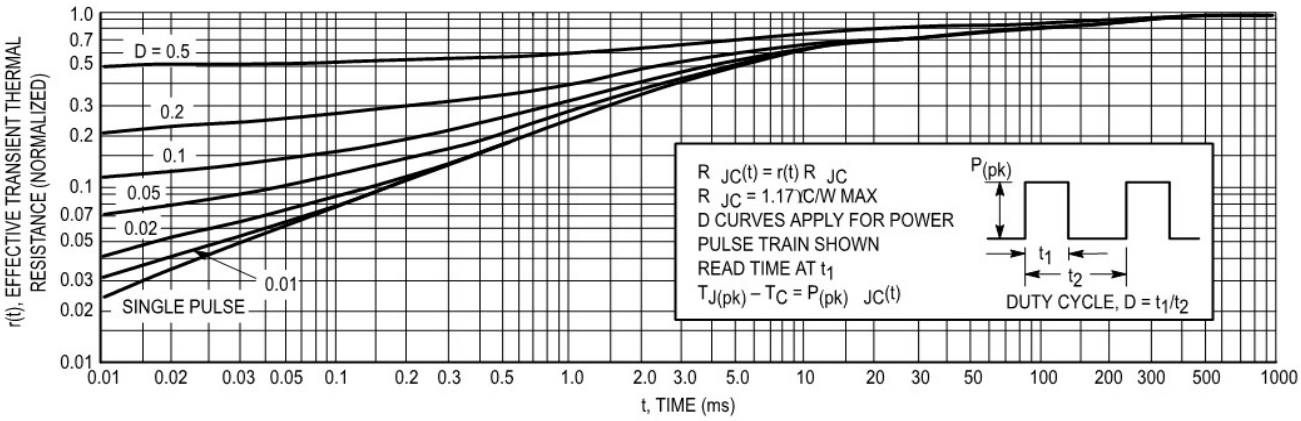



**Figure 4. Thermal Response**

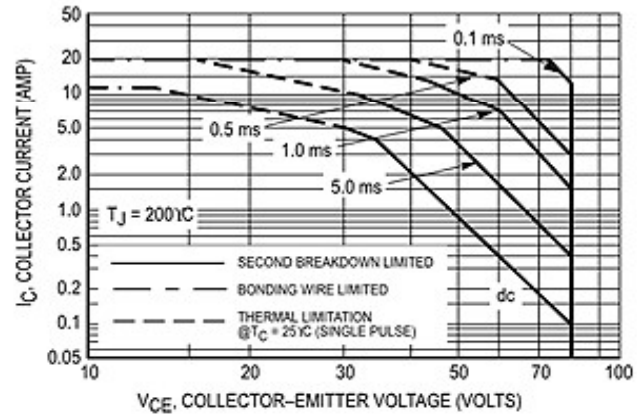



**Figure 5. 2N6058 ,2N6051**

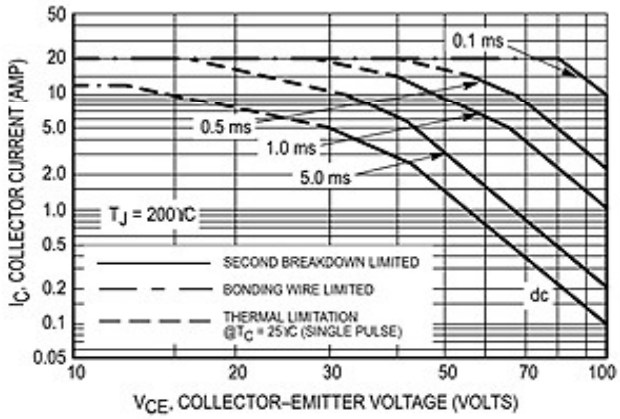



**Figure 6. 2N6052, 2N6059**

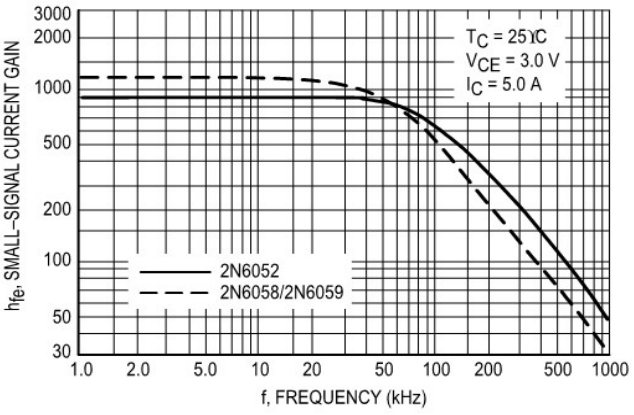



**Figure 7. Small–Signal Current Gain**

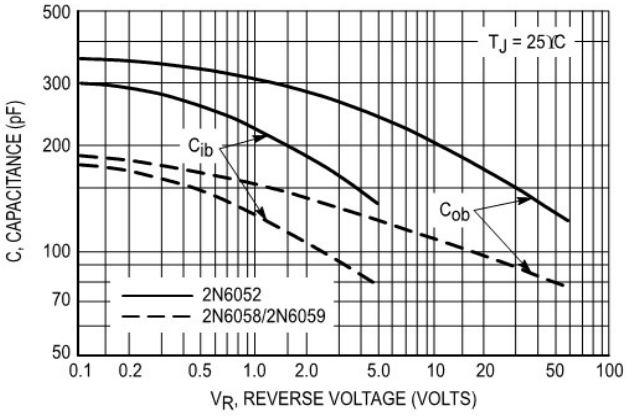



**Figure 8. Capacitance**

## TYPICAL CHARACTEISTICS CURVES

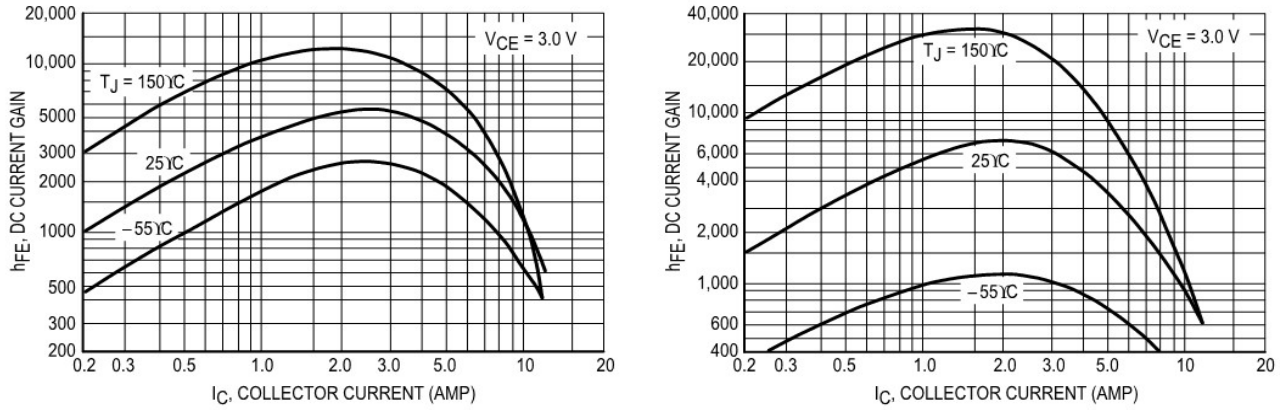



**Figure 9. DC Current Gain**

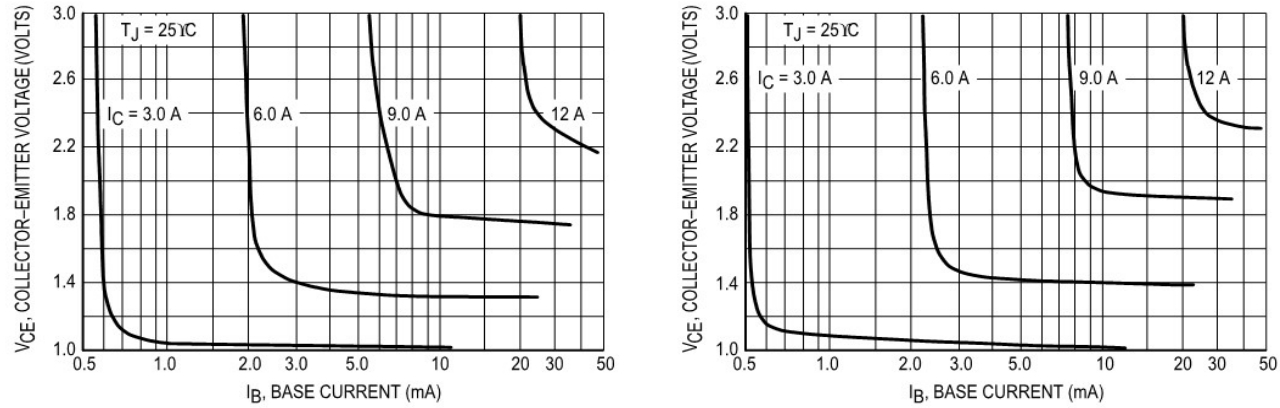



**Figure 10. Collector Saturation Region**

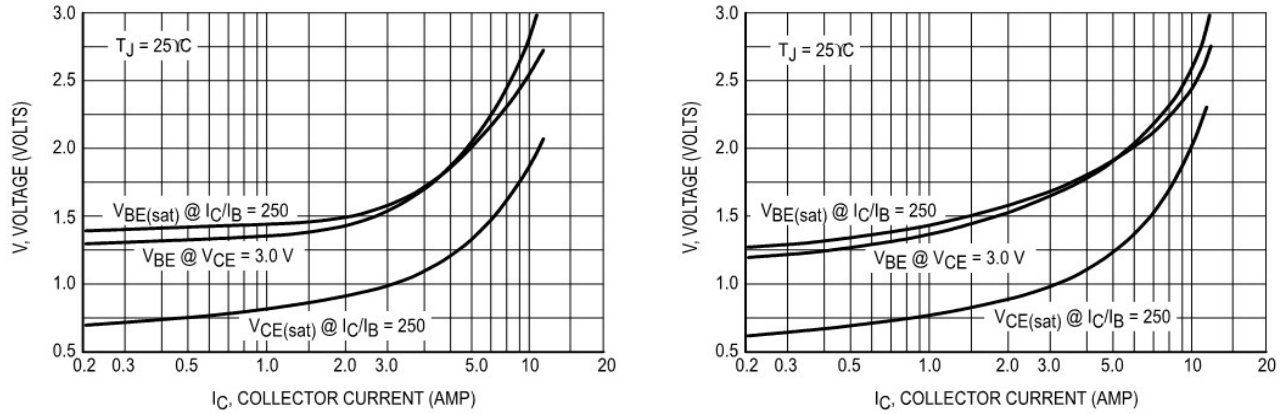
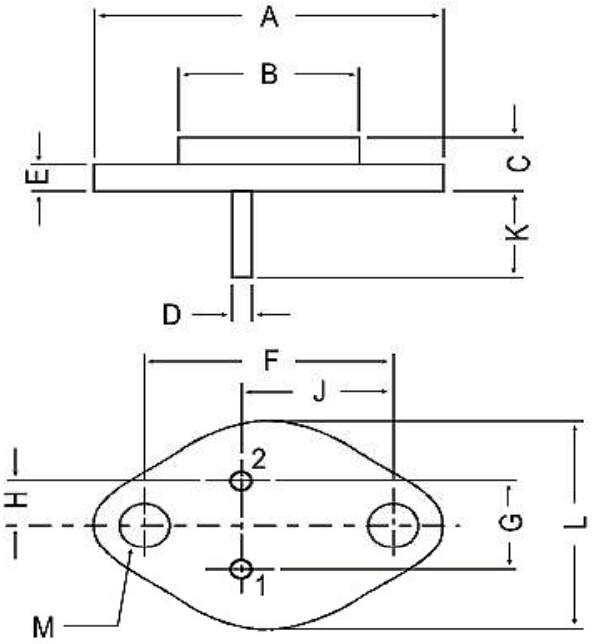


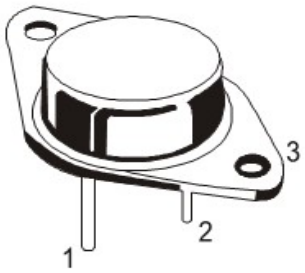

**Figure 11. “On” Voltages**

## Package Details




All dimensions in mm.

| DIM | MIN. | MAX. |
|---|---|---|
| A | — | 39.37 |
| B | — | 22.22 |
| C | 6.35 | 8.50 |
| D | 0.96 | 1.09 |
| E | — | 1.77 |
| F | 29.90 | 30.40 |
| G | 10.69 | 11.18 |
| H | 5.20 | 5.72 |
| J | 16.64 | 17.15 |
| K | 11.15 | 12.25 |
| L | — | 26.67 |
| M | 3.84 | 4.19 |




PIN CONFIGURATION
1. BASE
2. EMITTER
3. COLLECTOR

## Packing Detail

| PACKAGE | STANDARD PACK | | INNER CARTON BOX | | OUTER CARTON BOX | | |
|---|---|---|---|---|---|---|---|
| | Details | Net Weight/Qty | Size | Qty | Size | Qty | Gr Wt |
| TO-3 | 100 pcs/pkt | 1.3 kg/100 pcs | 12.5" x 8" x 1.8" | 0.1K | 17" x 11.5" x 21" | 2K | 27.5 kgs |

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# Recommended Product Storage Environment for Discrete Semiconductor Devices

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

## Shelf Life of CDIL Products

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as 2 years.
If products are stored longer than the shelf life of 2 years the products shall be subjected to quality check as per CDIL quality procedure.
The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

## Floor Life of CDIL Products and MSL Level

When the products are opened from the original packing, the floor life will start.
For this, the following JEDEC table may be referred:

| JEDEC MSL Level | | |
|---|---|---|
| **Level** | **Time** | **Condition** |
| 1 | Unlimited | ≤30 °C / 85% RH |
| 2 | 1 Year | ≤30 °C / 60% RH |
| 2a | 4 Weeks | ≤30 °C / 60% RH |
| 3 | 168 Hours | ≤30 °C / 60% RH |
| 4 | 72 Hours | ≤30 °C / 60% RH |
| 5 | 48 Hours | ≤30 °C / 60% RH |
| 5a | 24 Hours | ≤30 °C / 60% RH |
| 6 | Time on Label(TOL) | ≤30 °C / 60% RH |

## Customer Notes

**Component Disposal Instructions**

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

## Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).
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