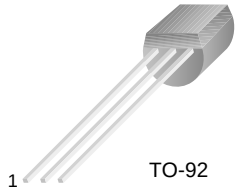
FAIRCHILD SEMICONDUCTOR®

July 2007

# MPSA13

## NPN Darlington Transistor

- This device is designed for applications requiring extremely high Current gain at collector Currents to 1.0A.
- Sourced from process 05.




TO-92

1. Emitter 2. Base 3. Collector

## Absolute Maximum Ratings $T_a$ = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | 30 | V |
| $V_{CBO}$ | Collector-Base Voltage | 30 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 10 | V |
| $I_C$ | Collector Current - Continuous | 1.2 | A |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

## Electrical Characteristics $T_a$=25°C unless otherwise noted

| Symbol | Parameter | Test Condition | Min. | Max. | Units |
|---|---|---|---|---|---|
| **Off Characteristics** | | | | | |
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage | $I_C$ = 100μA, $I_B$ = 0 | 30 | | V |
| $I_{CBO}$ | Collector-Cutoff Current | $V_{CB}$ = 30V, $I_E$ = 0 | | 100 | nA |
| $I_{EBO}$ | Emitter-Cutoff Current | $V_{EB}$ = 10V, $I_C$ = 0 | | 100 | nA |
| **On Characteristics *** | | | | | |
| $h_{FE}$ | DC Current Gain | $V_{CE}$ = 5.0V, $I_C$ =10mA<br>$V_{CE}$ = 5.0, $I_C$ = 100mA | 5,000<br>10,000 | | |
| $V_{CE\ (sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ = 100mA, $I_B$ = 0.1mA | | 1.5 | V |
| $V_{BE\ (on)}$ | Base-Emitter On Voltage | $I_C$ = 100mA,$V_{CE}$ = 5.0V | | 2.0 | V |
| **Small Signal Characteristics** | | | | | |
| $f_T$ | Current Gain Bandwidth Product | $I_C$ = 10mA, $V_{CE}$ = 10V, f = 100MHz | 125 | | pF |

* Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

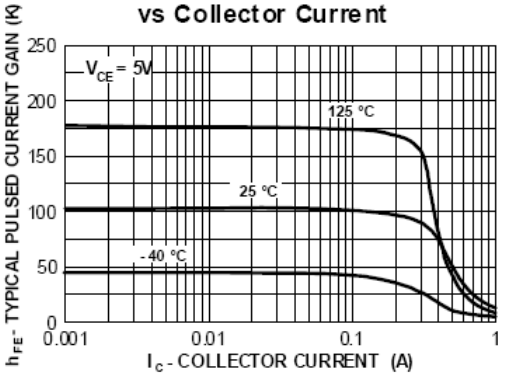
## Thermal Characteristics $T_a$=25°C unless otherwise noted

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $P_D$ | Total Device Dissipation<br>Derate above 25°C | 625<br>5.0 | mW<br>mW/°C |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 83.3 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 200 | °C/W |

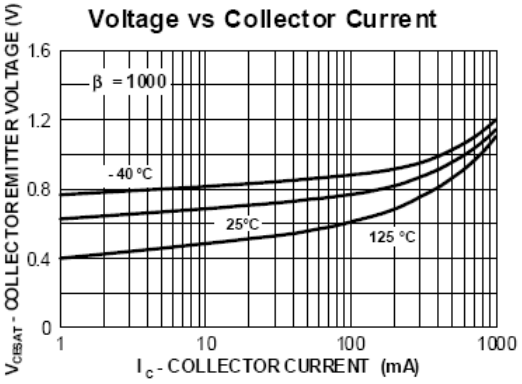
* Device mounted on FR-4PCB 1.6" × 1.6" × 0.06".

## Typical Characteristics

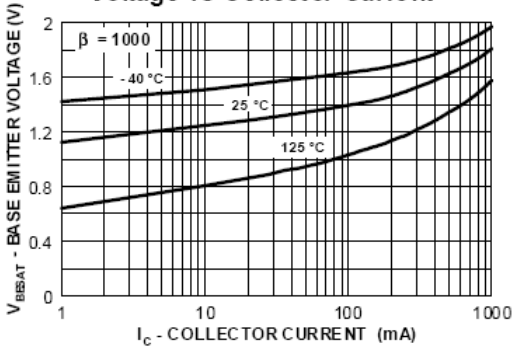
Typical Pulsed Current Gain vs Collector Current



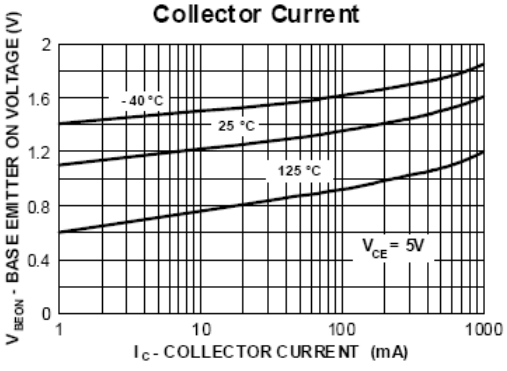

Collector-Emitter Saturation Voltage vs Collector Current



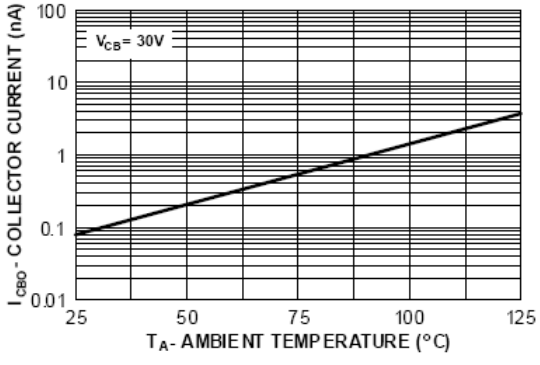

Base-Emitter Saturation Voltage vs Collector Current



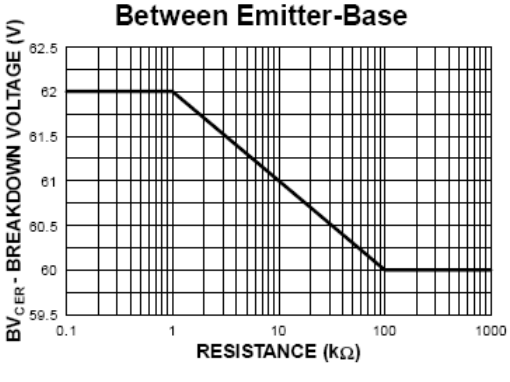

Base Emitter ON Voltage vs Collector Current




Collector-Cutoff Current vs Ambient Temperature

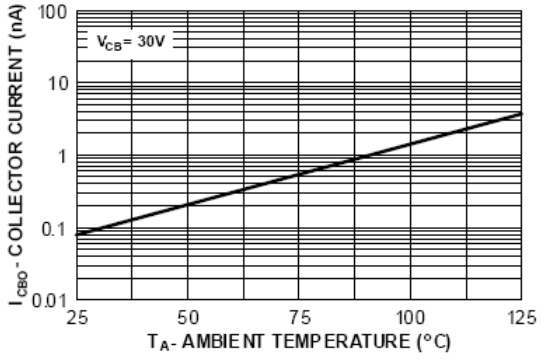



Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base

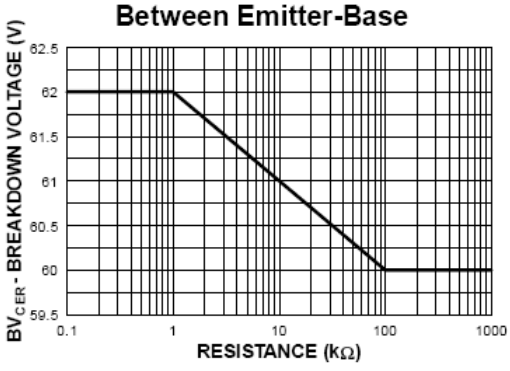


## Typical Characteristics (continued)

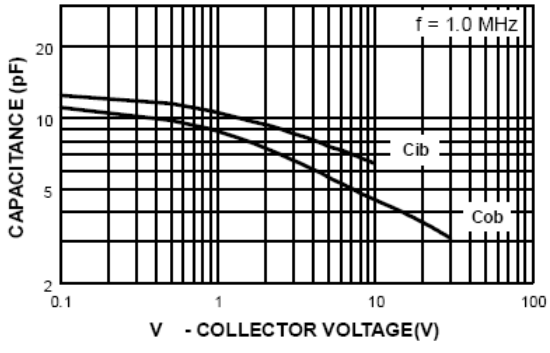
Collector-Cutoff Current
vs Ambient Temperature



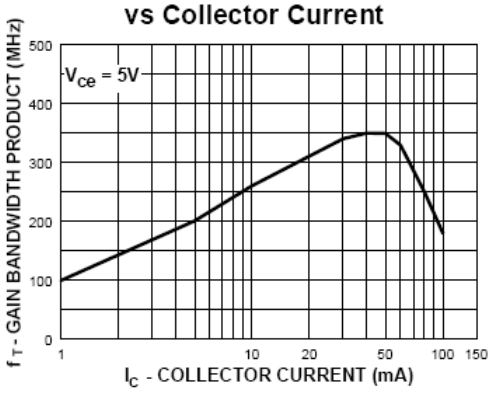

Collector-Emitter Breakdown
Voltage with Resistance
Between Emitter-Base




Input and Output Capacitance
vs Reverse Voltage

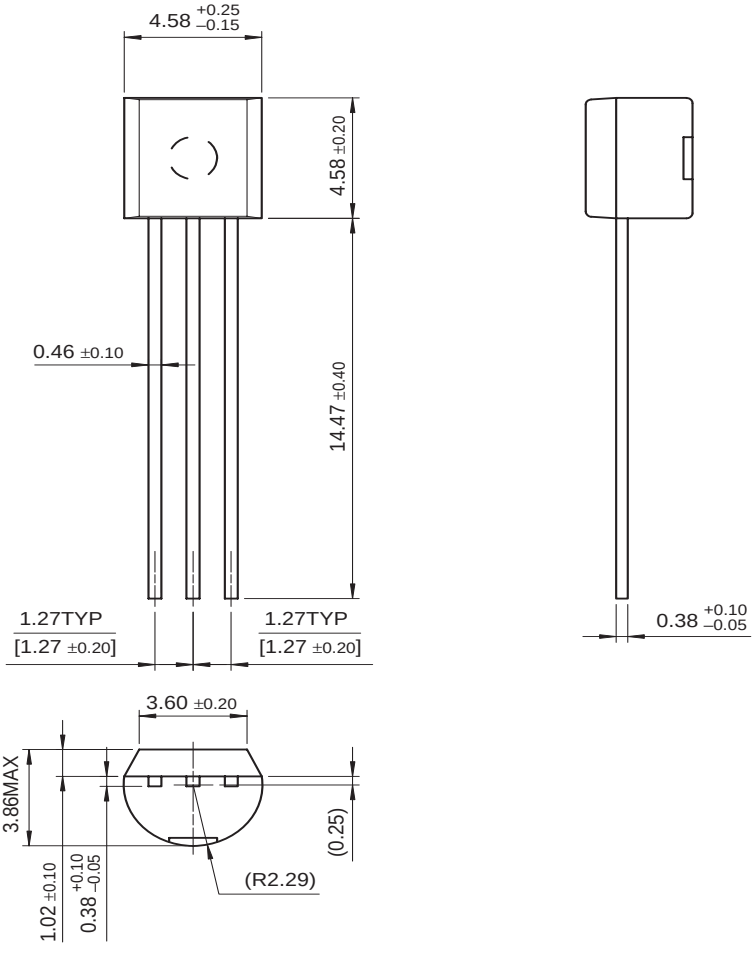



Gain Bandwidth Product
vs Collector Current



## Mechanical Dimensions

# TO-92




Dimensions in Millimeters

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