## Low Vcesat NPN Epitaxial Planar Transistor

# BTD2012FP



## Features

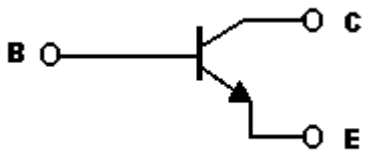
- Low collector-to-emitter saturation voltage, typically $V_{CE(SAT)}$=0.25V at $I_C$ / $I_B$=2A / 0.2A
- Excellent DC current gain characteristics
- High allowable power dissipation, $P_D$=25W($T_C$=25℃)
- Large current capability
- Pb-free package

## Applications

- DC-DC converter, relay drivers, lamp drivers, motor drivers, strobes.

## Symbol

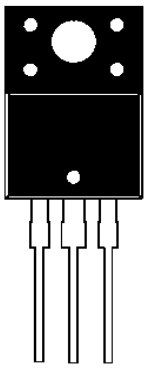
BTD2012FP




B：Base
C：Collector
E：Emitter

## Outline

TO-220FP



B C E

## Absolute Maximum Ratings (Ta=25°C)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 80 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 60 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 6 | V |
| Collector Current (DC) | $I_C$ | 3 | A |
| Collector Current (Pulse) | $I_{CP}$ | 6 (Note 1) | |
| Base Current | $I_B$ | 0.5 | A |
| Power Dissipation @ $T_A$=25℃ | $P_D$ | 2 | W |
| Power Dissipation @ $T_C$=25℃ | $P_D$ | 25 | |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 62.5 | °C/W |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 5 | °C/W |
| Insulation Withstand Voltage (RMS) from All Three Leads to External Heatsink | Visol | 1000 | V |
| Junction Temperature | Tj | 150 | °C |
| Storage Temperature | Tstg | -55~+150 | °C |

Note : 1. Single Pulse , Pw≦380μs,Duty≦2%.



## Characteristics (Ta=25°C)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| $BV_{CBO}$ | 80 | - | - | V | $I_C$=10μA, $I_E$=0 |
| *$BV_{CEO}$ | 60 | - | - | V | $I_C$=1mA, $I_B$=0 |
| $BV_{EBO}$ | 6 | - | - | V | $I_C$=10μA, $I_C$=0 |
| $I_{CBO}$ | - | - | 1 | μA | $V_{CB}$=80V, $I_E$=0 |
| $I_{EBO}$ | - | - | 1 | μA | $V_{EB}$=4V, $I_C$=0 |
| *$V_{CE(sat)}$ 1 | - | 150 | 220 | mV | $I_C$=1A, $I_B$=50mA |
| *$V_{CE(sat)}$ 2 | - | 250 | 350 | mV | $I_C$=2A, $I_B$=200mA |
| *$V_{BE(sat)}$ | - | 1 | 1.2 | V | $I_C$=2A, $I_B$=100mA |
| *$V_{BE(on)}$ | - | - | 1 | V | $V_{CE}$=2V, $I_C$=500mA |
| *$h_{FE}$ 1 | 120 | - | 560 | - | $V_{CE}$=5V, $I_C$=500mA |
| *$h_{FE}$ 2 | 60 | - | - | - | $V_{CE}$=5V, $I_C$=3A |
| $f_T$ | - | 100 | - | MHz | $V_{CE}$=5V, $I_C$=500mA,f=5MHz |
| Cob | - | 15 | - | pF | $V_{CB}$=10V, f=1MHz |

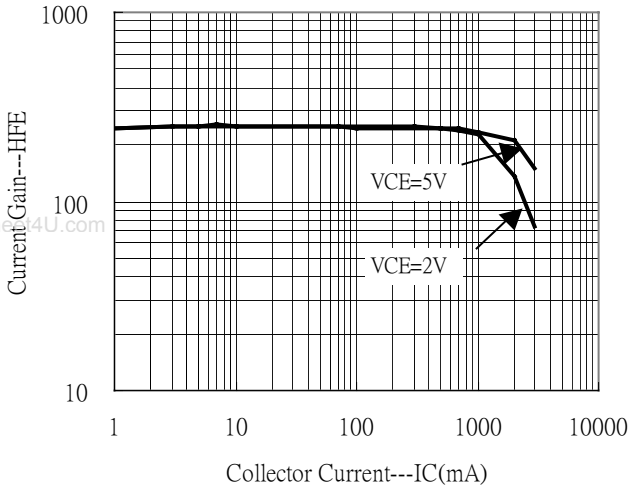
*Pulse Test : Pulse Width ≤380μs, Duty Cycle≤2%

## Classification of $h_{FE}$ 1

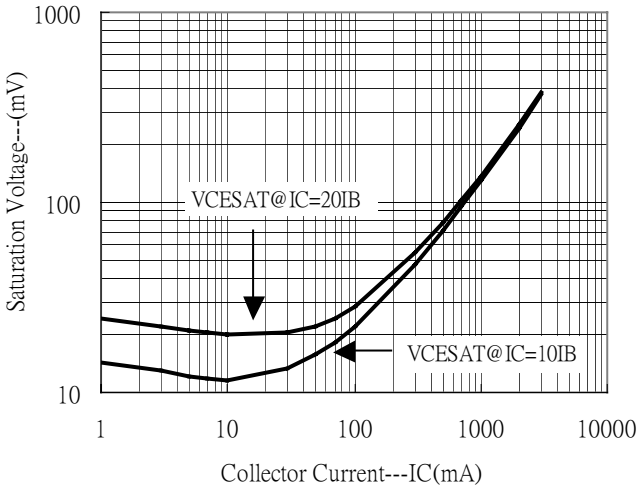
| Rank | Q | R | S |
|---|---|---|---|
| Range | 120~270 | 180~390 | 270~560 |

## Characteristic Curves

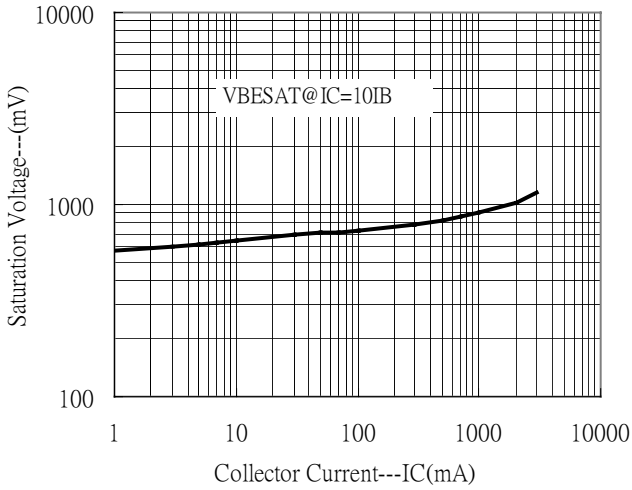
Current Gain vs Collector Current



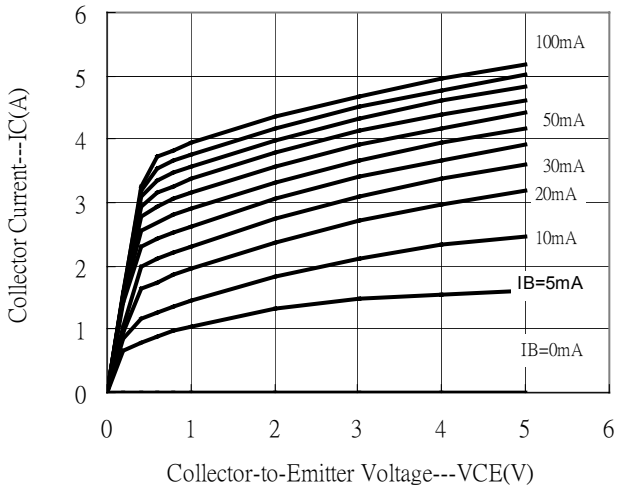

Saturation Voltage vs Collector Current



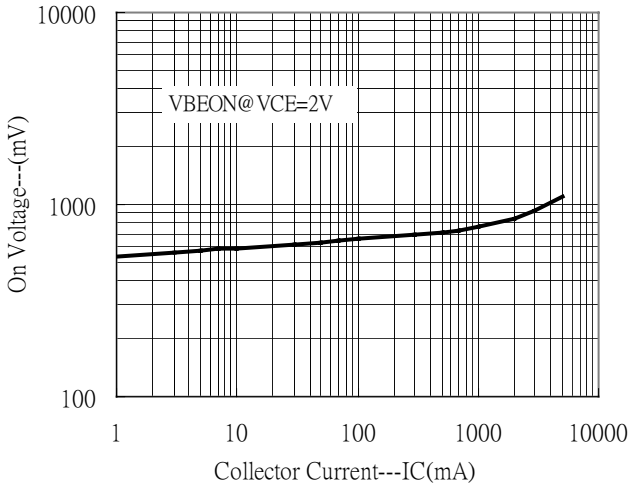

Saturation Voltage vs Collector Current



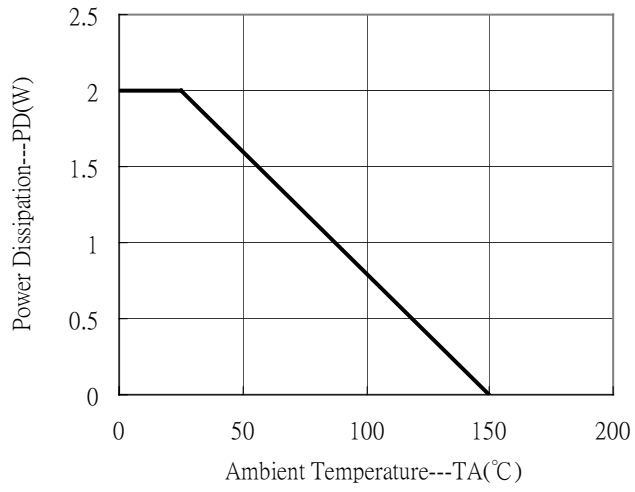

Output Characteristics



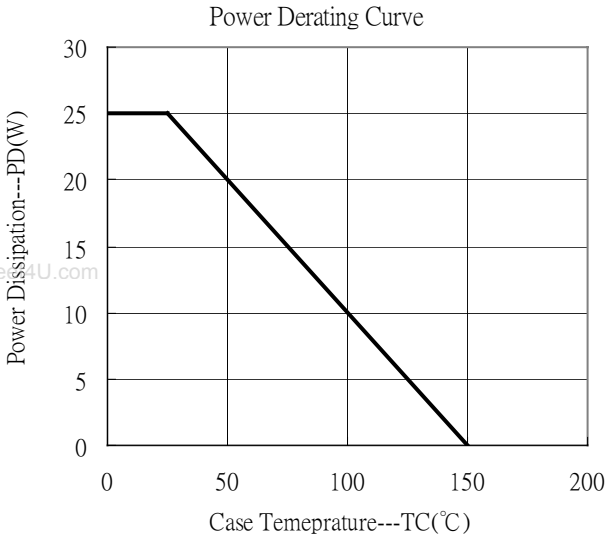

On Voltage vs Collector Current



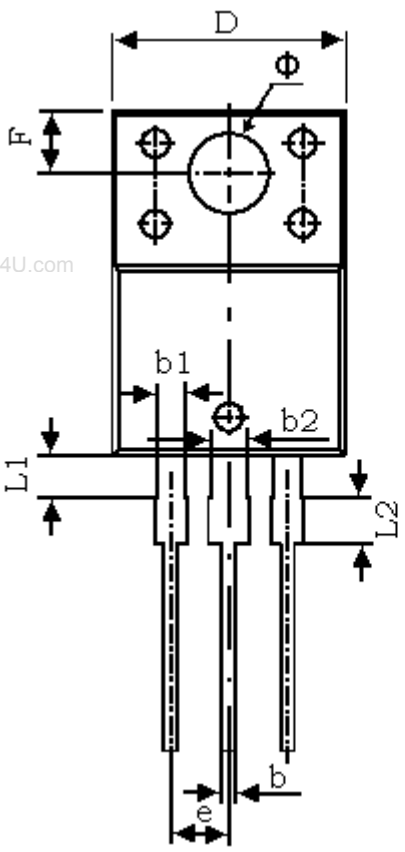

Power Derating Curve

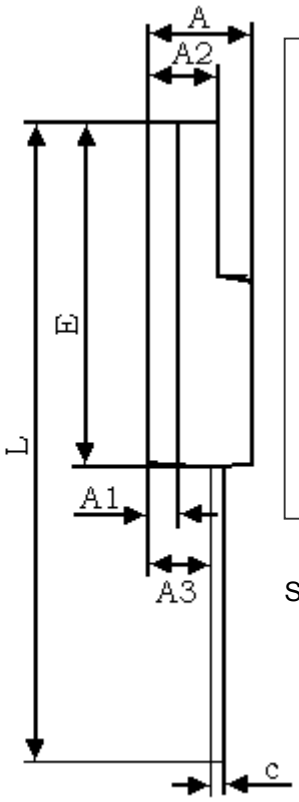


## Characteristic Curves(Cont.)

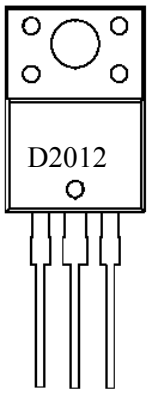


## TO-220FP Dimension




Marking:




Style: Pin 1.Base 2.Collector 3.Emitter 4.Collector

3-Lead TO-220FP Plastic Package
CYStek Package Code: FP

*: Typical

| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.169 | 0.185 | 4.300 | 4.700 | D | 0.392 | 0.408 | 9.960 | 10.360 |
| A1 | 0.051 REF | | 1.300 REF | | E | 0.583 | 0.598 | 14.800 | 15.200 |
| A2 | 0.110 | 0.126 | 2.800 | 3.200 | e | 0.100 TYP | | 2.540 TYP | |
| A3 | 0.098 | 0.114 | 2.500 | 2.900 | F | 0.106 REF | | 2.700 REF | |
| b | 0.020 | 0.030 | 0.500 | 0.750 | Φ | 0.138 REF | | 3.500 REF | |
| b1 | 0.043 | 0.053 | 1.100 | 1.350 | L | 1.102 | 1.118 | 28.000 | 28.400 |
| b2 | 0.059 | 0.069 | 1.500 | 1.750 | L1 | 0.067 | 0.075 | 1.700 | 1.900 |
| c | 0.020 | 0.030 | 0.500 | 0.750 | L2 | 0.075 | 0.083 | 1.900 | 2.100 |

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: 42 Alloy ; solder plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0