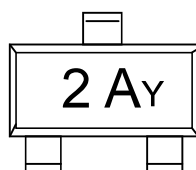


**Electrical Characteristics @ 25°C Unless Otherwise Specified**

| Parameter                            | Symbol        | Min   | Typ | Max   | Units | Conditions   |
|--------------------------------------|---------------|-------|-----|-------|-------|--|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | -40   |     |       | V     | $I_C = -10\mu A, I_E = 0$                          |
| Collector-Emitter Breakdown Voltage* | $V_{(BR)CEO}$ | -40   |     |       | V     | $I_C = -1mA, I_B = 0$                              |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | -5    |     |       | V     | $I_E = -10\mu A, I_C = 0$                          |
| Collector-Base Cutoff Current        | $I_{CBO}$     |       |     | -100  | nA    | $V_{CB} = -40V, I_E = 0$                           |
| Collector Cutoff Current             | $I_{CEX}$     |       |     | -50   | nA    | $V_{CE} = -30V, V_{BE} = -3V$                      |
| Emitter-Base Cutoff Current          | $I_{EBO}$     |       |     | -100  | nA    | $V_{EB} = -5V, I_C = 0$                            |
| DC Current Gain*                     | $h_{FE(1)}$   | 100   |     | 300   |       | $V_{CE} = -1V, I_C = -10mA$                        |
|                                      | $h_{FE(2)}$   | 60    |     |       |       | $V_{CE} = -1V, I_C = -50mA$                        |
|                                      | $h_{FE(3)}$   | 30    |     |       |       | $V_{CE} = -1V, I_C = -100mA$                       |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |       |     | -0.25 | V     | $I_C = -10mA, I_B = -1mA$                          |
|                                      |               |       |     | -0.4  | V     | $I_C = -50mA, I_B = -5mA$                          |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | -0.65 |     | -0.85 | V     | $I_C = -10mA, I_B = -1mA$                          |
|                                      |               |       |     | -0.95 | V     | $I_C = -50mA, I_B = -5mA$                          |
| Transition Frequency                 | $f_T$         | 250   |     |       | MHz   | $V_{CE} = -20V, I_C = -10mA, f = 100MHz$           |
| Output Capacitance                   | $C_{cbo}$     |       |     | 4.5   | pF    | $V_{CB} = -5V, I_E = 0, f = 1MHz$                  |
| Input Capacitance                    | $C_{ibo}$     |       |     | 10    | pF    | $V_{BE} = -0.5V, I_C = 0, f = 1MHz$                |
| Noise Figure                         | NF            |       |     | 4     | dB    | $V_{CE} = -5V, I_C = 100\mu A, R_S = 1K, f = 1KHz$ |
| Delay Time                           | $t_d$         |       |     | 35    | ns    | $V_{CC} = -3V, I_C = -10mA$                        |
| Rise Time                            | $t_r$         |       |     | 35    | ns    | $V_{BE} = -0.5V, I_{B1} = I_{B2} = -1mA$           |
| Storage Time                         | $t_s$         |       |     | 225   | ns    | $V_{CC} = -3V, I_C = -10mA$                        |
| Fall Time                            | $t_f$         |       |     | 75    | ns    | $I_{B1} = I_{B2} = -1mA$                           |

\*Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2.0\%$

**Marking Information**



2A = Product Type Marking Code  
Y = Date Code Marking

Date code Key (2 years a cycle)

| Year  | 2011 |     |     |     |     |     |     |     |     |     |     |     |
|-------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month | Jan  | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Code  | J    | O   | L   | C   | K   | B   | P   | D   | M   | E   | G   | F   |

| Year  | 2012 |     |     |     |     |     |     |     |     |     |     |     |
|-------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month | Jan  | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Code  | W    | N   | Y   | T   | R   | H   | A   | I   | U   | X   | Z   | S   |

## Curve Characteristics

Fig. 1 - Static Characteristics

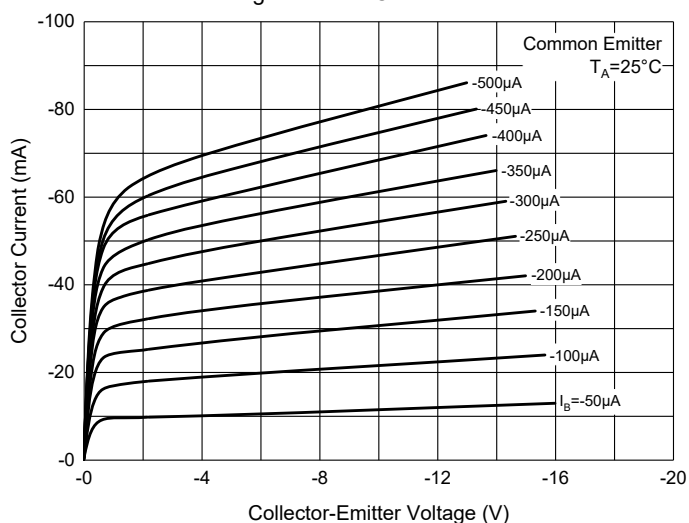


Fig. 2 - DC Current Gain Characteristics

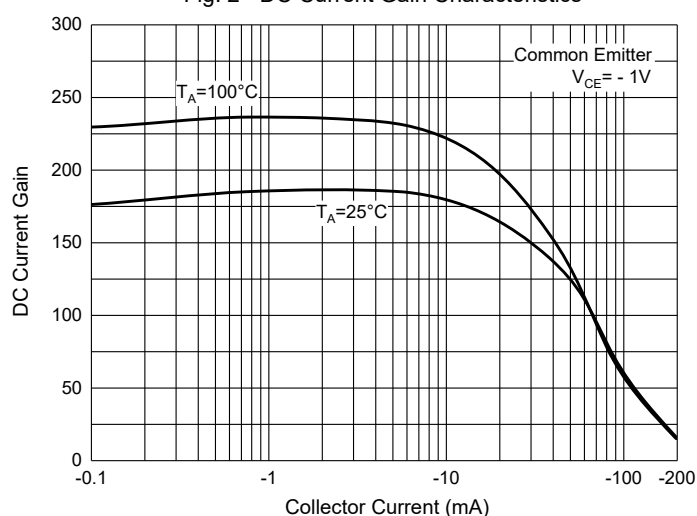


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

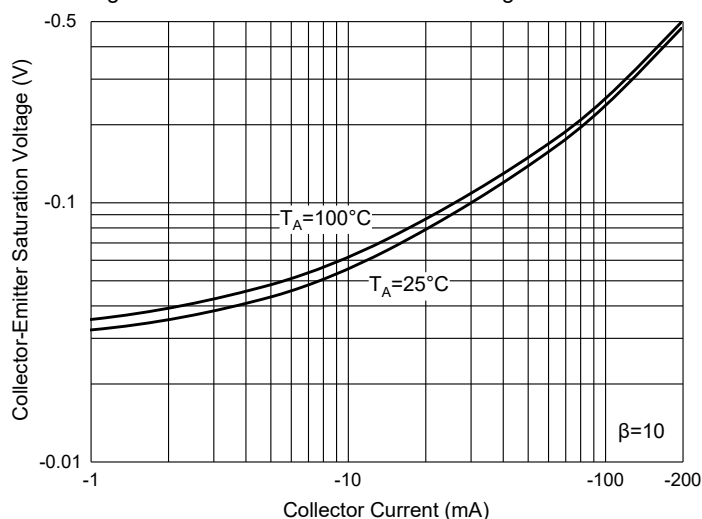


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

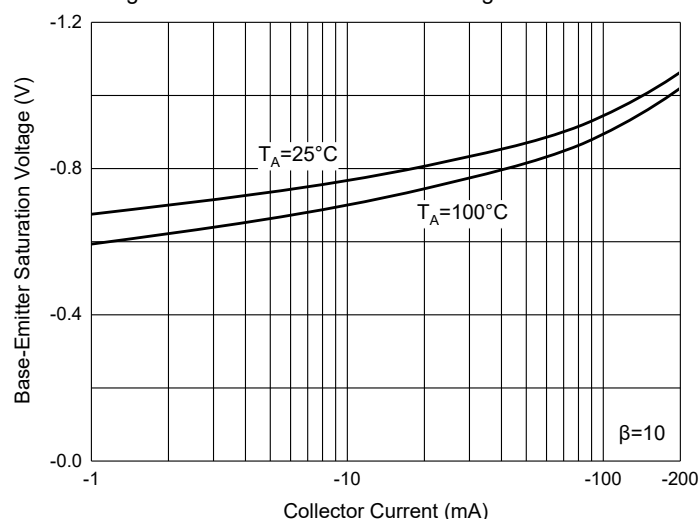


Fig. 5 - Base-Emitter Voltage Characteristics

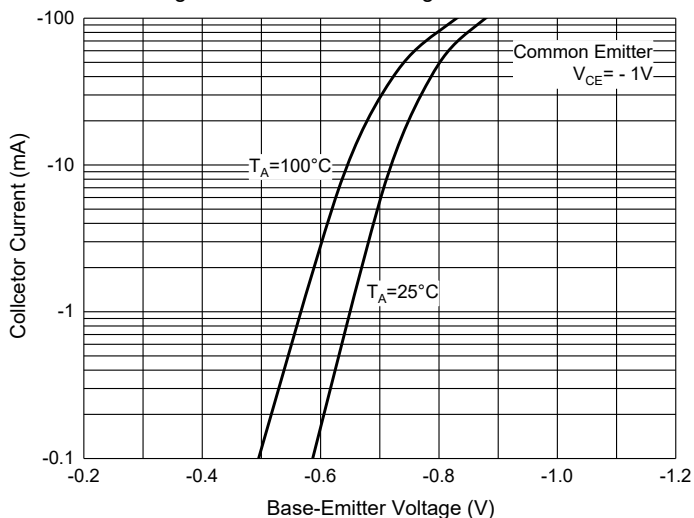
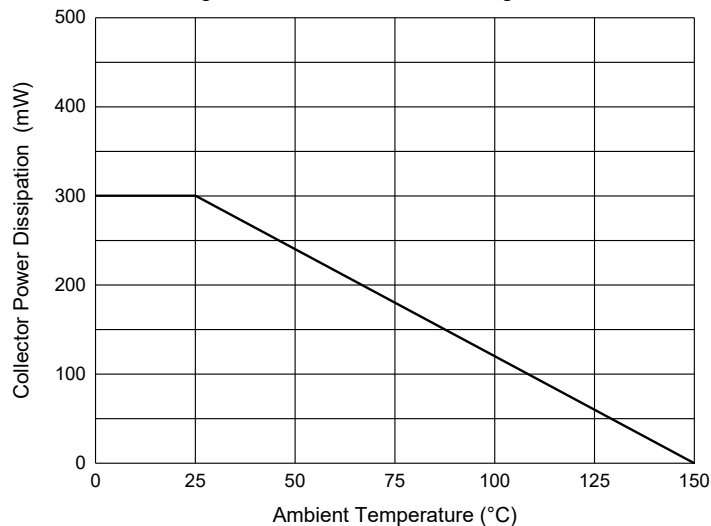


Fig. 6 - Collector Power Derating Curve



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 3Kpcs/Reel |

Note : Adding "-HF" Suffix For Halogen Free, eg. Part Number-TP-HF

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