

**Features**

- Ultra-Small Surface Mount Package
- Halogen Free. "Green" Device (Note 1)
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings @ 25°C Unless Otherwise Specified**

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 625°C/W Junction to Ambient

**NPN Pin1,&6**

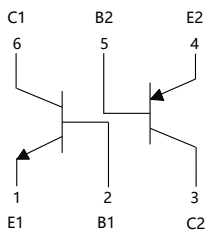
| Parameter                 | Symbol    | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-Base Voltage    | $V_{CBO}$ | 50     | V    |
| Collector-Emitter Voltage | $V_{CEO}$ | 45     | V    |
| Emitter-Base Voltage      | $V_{EBO}$ | 6      | V    |
| Collector Current         | $I_C$     | 100    | mA   |
| Peak Collector Current    | $I_{CM}$  | 200    | mA   |
| Power Dissipation         | $P_C$     | 200    | mW   |

**PNP Pin' ,(,)**

| Parameter                 | Symbol    | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-Base Voltage    | $V_{CBO}$ | -50    | V    |
| Collector-Emitter Voltage | $V_{CEO}$ | -45    | V    |
| Emitter-Base Voltage      | $V_{EBO}$ | -5     | V    |
| Collector Current         | $I_C$     | -100   | mA   |
| Peak Collector Current    | $I_{CM}$  | -200   | mA   |
| Power Dissipation         | $P_C$     | 200    | mW   |

Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

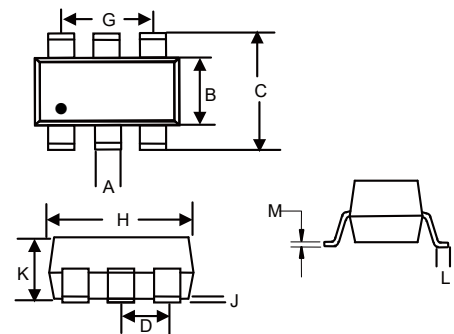
**Internal Structure**



**Marking: 7P / 1K**

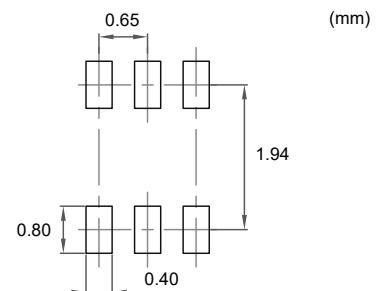
**NPN/PNP  
Small Signal  
Transistors**

**SOT-363**



| DIM | DIMENSIONS |       |       |      | NOTE |
|-----|------------|-------|-------|------|------|
|     | INCHES     |       | MM    |      |      |
|     | MIN        | MAX   | MIN   | MAX  |      |
| A   | 0.006      | 0.014 | 0.15  | 0.35 |      |
| B   | 0.045      | 0.053 | 1.15  | 1.35 |      |
| C   | 0.079      | 0.096 | 2.00  | 2.45 |      |
| D   | 0.026      |       | 0.65  |      | TYP. |
| G   | 0.047      | 0.055 | 1.20  | 1.40 |      |
| H   | 0.071      | 0.087 | 1.80  | 2.20 |      |
| J   | -----      | 0.004 | ----- | 0.10 |      |
| K   | 0.031      | 0.043 | 0.80  | 1.10 |      |
| L   | 0.010      | 0.018 | 0.26  | 0.46 |      |
| M   | 0.003      | 0.006 | 0.08  | 0.15 |      |

**Suggested Solder Pad Layout**



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

| Parameter                            | Symbol        | Min  | Typ | Max  | Units | Conditions   |
|--------------------------------------|---------------|------|-----|------|-------|--|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | 50   |     |      | V     | $I_C=10\mu A, I_E=0$   |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 45   |     |      | V     | $I_C=10mA, I_B=0$  |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | 6    |     |      | V     | $I_E=1\mu A, I_C=0$  |
| Collector-Base Cutoff Current        | $I_{CBO}$     |      |     | 15   | nA    | $V_{CB}=30V, I_E=0$  |
| Emitter-Base Cutoff Current          | $I_{EBO}$     |      |     | 100  | nA    | $V_{EB}=5V, I_C=0$   |
| DC Current Gain                      | $h_{FE}$      | 200  |     | 450  |       | $V_{CE}=5V, I_C=2mA$   |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |      |     | 0.25 | V     | $I_C=10mA, I_B=0.5mA$  |
|                                      |               |      |     | 0.6  | V     | $I_C=100mA, I_B=5mA$   |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ |      | 0.7 |      | V     | $I_C=10mA, I_B=0.5mA$  |
|                                      |               |      | 0.9 |      | V     | $I_C=100mA, I_B=5mA$   |
| Base-Emitter Voltage                 | $V_{BE}$      | 0.58 |     | 0.7  | V     | $V_{CE}=5V, I_C=2mA$   |
|                                      |               |      |     | 0.72 | V     | $V_{CE}=5V, I_C=10mA$  |
| Collector Output Capacitance         | $C_{ob}$      |      |     | 6    | pF    | $V_{CB}=10V, f=1MHz$   |
| Transition Frequency                 | $f_T$         | 100  |     |      | MHz   | $V_{CE}=5V, I_C=10mA, f=100MHz$                                  |
| Noise Figure                         | NF            |      |     | 10   | dB    | $V_{CE}=5V, I_C=0.2mA, f=1KHz$<br>$R_g=2K\Omega, \Delta f=200Hz$ |

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

| Parameter                            | Symbol        | Min  | Typ  | Max   | Units | Conditions   |
|--------------------------------------|---------------|------|------|-------|-------|--|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | -50  |      |       | V     | $I_C = -10\mu A, I_E = 0$  |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | -45  |      |       | V     | $I_C = -10mA, I_B = 0$   |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | -5   |      |       | V     | $I_E = -1\mu A, I_C = 0$   |
| Collector-Base Cutoff Current        | $I_{CBO}$     |      |      | -15   | nA    | $V_{CB} = -30V, I_E = 0$   |
| Emitter-Base Cutoff Current          | $I_{EBO}$     |      |      | -100  | nA    | $V_{EB} = -5V, I_C = 0$  |
| DC Current Gain                      | $h_{FE}$      | 220  |      | 475   |       | $V_{CE} = -5V, I_C = -2mA$   |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |      |      | -0.3  | V     | $I_C = -10mA, I_B = -0.5mA$  |
|                                      |               |      |      | -0.65 | V     | $I_C = -100mA, I_B = -5mA$   |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ |      | -0.7 |       | V     | $I_C = -10mA, I_B = -0.5mA$  |
|                                      |               |      |      | -0.95 | V     | $I_C = -100mA, I_B = -5mA$   |
| Base-Emitter Voltage                 | $V_{BE}$      | -0.6 |      | -0.75 | V     | $V_{CE} = -5V, I_C = -2mA$   |
|                                      |               |      |      | -0.82 | V     | $V_{CE} = -5V, I_C = -10mA$  |
| Collector Output Capacitance         | $C_{ob}$      |      |      | 4.5   | pF    | $V_{CB} = -10V, I_E = 0, f = 1MHz$   |
| Transition Frequency                 | $f_T$         | 100  |      |       | MHz   | $V_{CE} = -5V, I_C = -10mA, f = 100MHz$                                      |
| Noise Figure                         | NF            |      |      | 10    | dB    | $V_{CE} = -5V, I_C = -0.2mA, f = 1KHz$<br>$R_g = 2K\Omega, \Delta f = 200Hz$ |

**Curve Characteristics (NPN Transistor)**

Fig. 1 - Static Characteristics

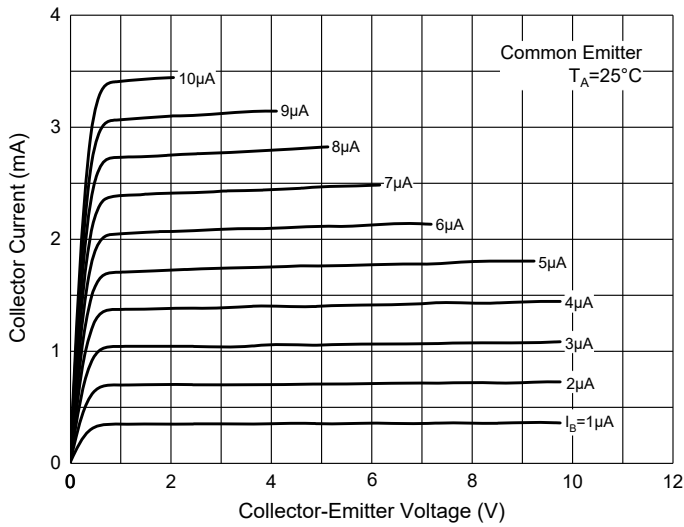


Fig. 2 - DC Current Gain Characteristics

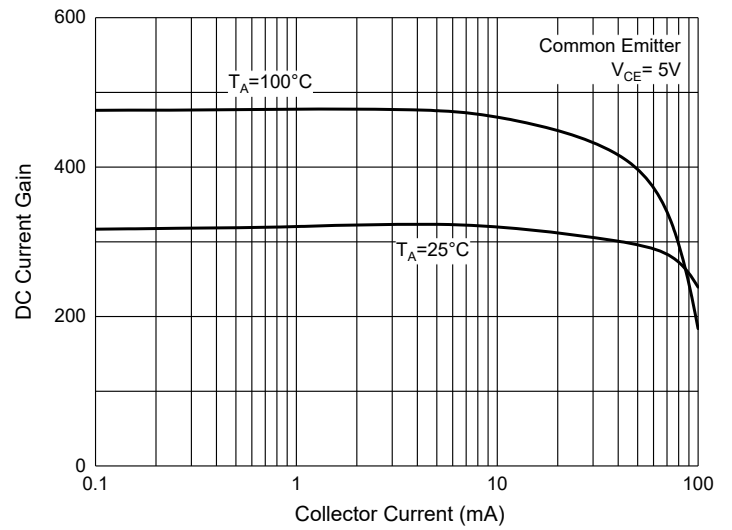


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

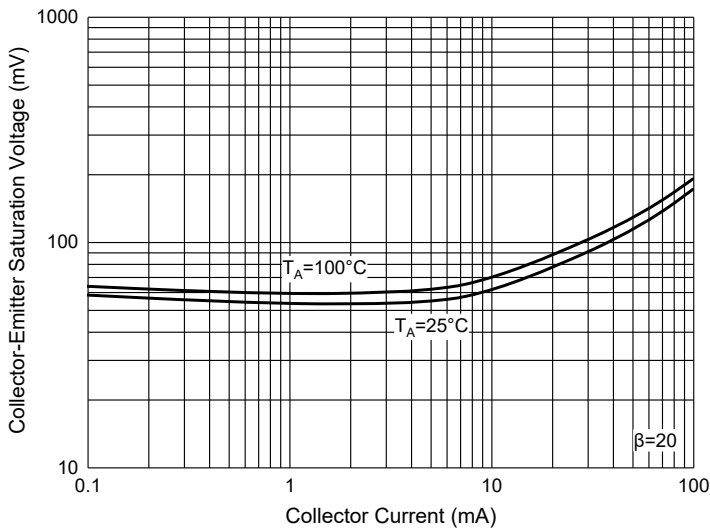


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

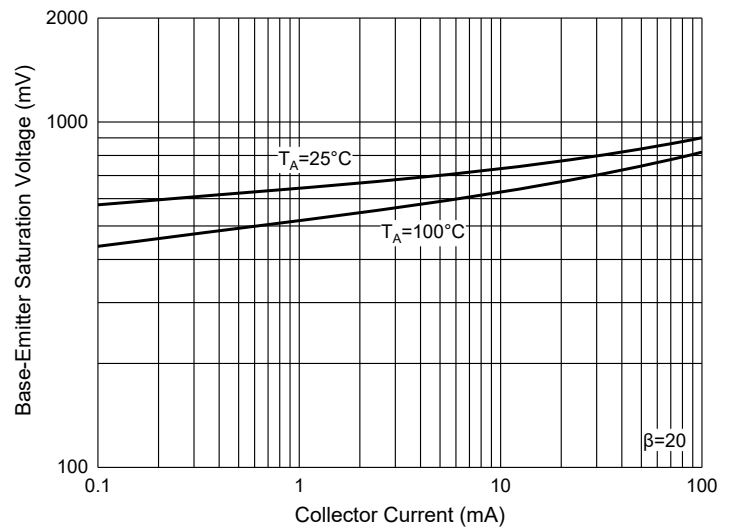


Fig. 5 - Base-Emitter Voltage Characteristics

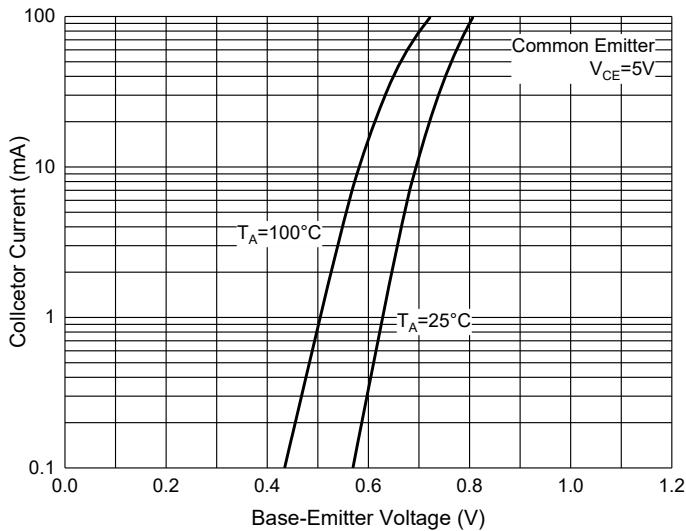
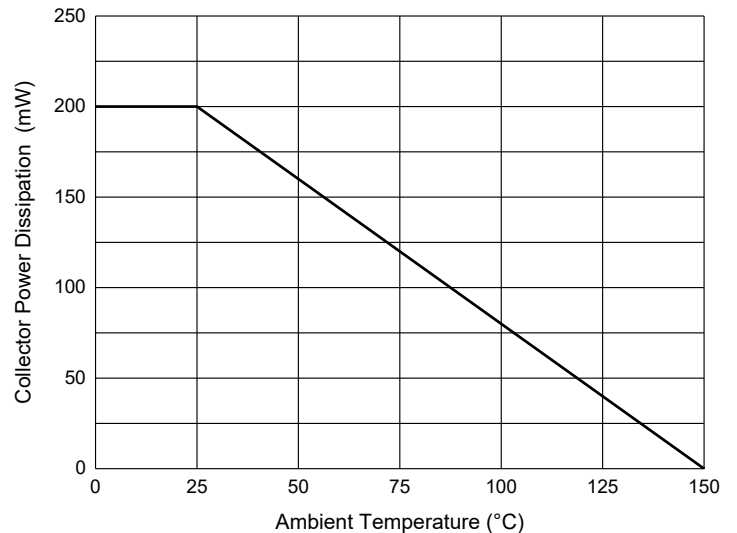


Fig. 6 - Collector Power Derating Curve



**Curve Characteristics (PNP Transistor)**

Fig. 7 - Static Characteristics

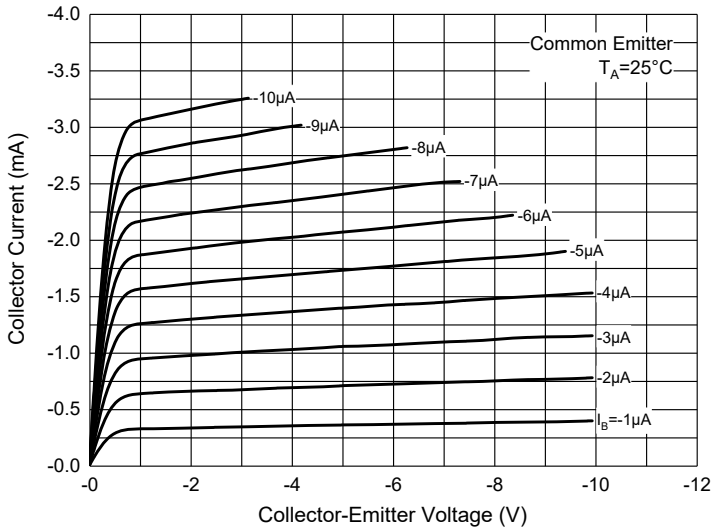


Fig. 8 - DC Current Gain Characteristics

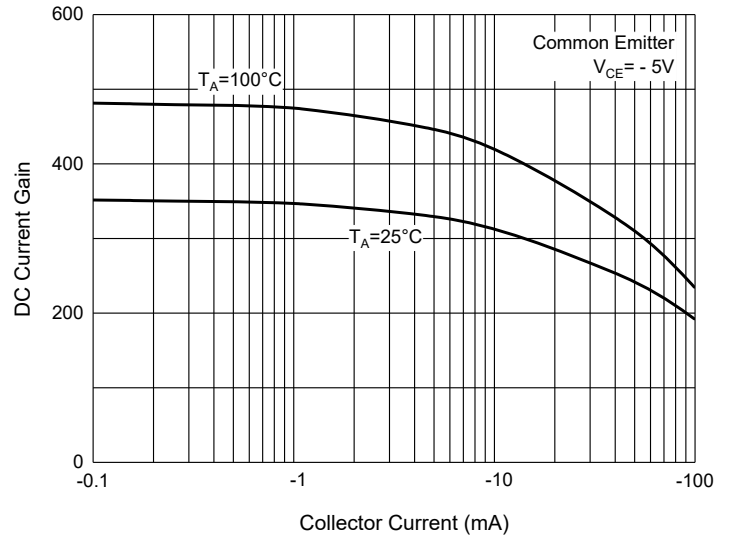


Fig. 9 - Collector-Emitter Saturation Voltage Characteristics

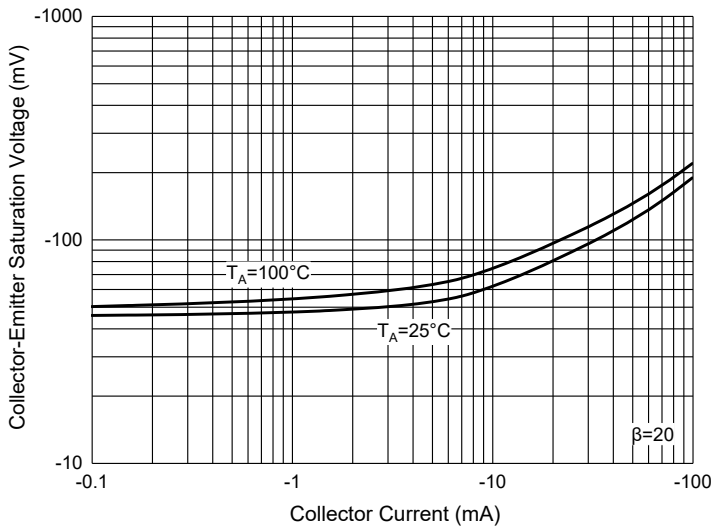


Fig. 10 - Base-Emitter Saturation Voltage Characteristics

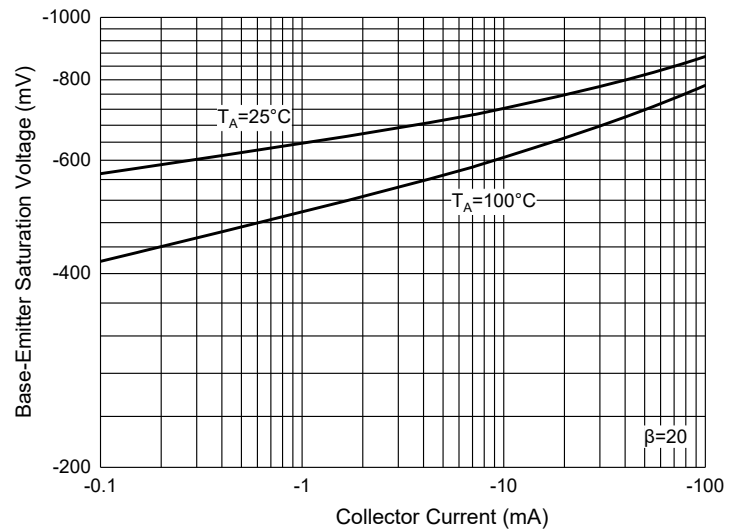


Fig. 11 - Base-Emitter Voltage Characteristics

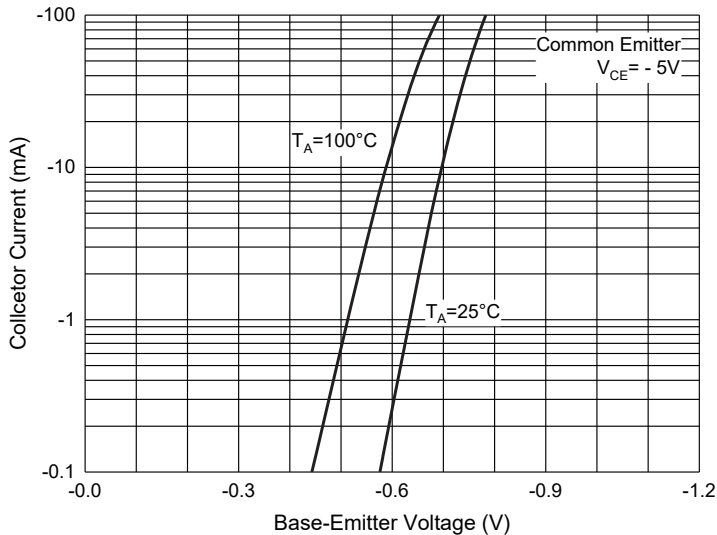


Fig. 12- Collector Power Derating Curve

