

MICRO ELECTRONICS

BCY 58
BCY 59

GENERAL DESCRIPTION :

The BCY 58 and BCY 59 are NPN silicon planar epitaxial transistor. It features low saturation voltage and high gain. It is intended for use as audio frequency amplifier, magnetic core driver and general purpose industrial applications.

MECHANICAL OUTLINE

TO-18



CBE

ABSOLUTE MAXIMUM RATINGS :

Continuous Power Dissipation @ $T_A=25^{\circ}\text{C}$, P_{max}
 Continuous Power Dissipation @ $T_C=45^{\circ}\text{C}$, P_{max}
 Maximum Collector Junction Temperature, T_j
 Storage Temperature Range, T_{stg}
 Soldering Temperature (10 sec. time limit)
 Continuous Collector Current, $I_C \text{ max}$
 Continuous Base Current, $I_B \text{ max}$
 Collector-Emitter Voltage, V_{CES}
 Collector-Emitter Voltage, V_{CEO}
 Emitter-Base Voltage, V_{EBO}

| | BCY 58 | BCY 59 |
|--|---|---|
| Continuous Power Dissipation @ $T_A=25^{\circ}\text{C}$, P_{max} | 390mW | 390mW |
| Continuous Power Dissipation @ $T_C=45^{\circ}\text{C}$, P_{max} | 1W | 1W |
| Maximum Collector Junction Temperature, T_j | 200 $^{\circ}\text{C}$ | 200 $^{\circ}\text{C}$ |
| Storage Temperature Range, T_{stg} | -65 $^{\circ}\text{C}$ to +200 $^{\circ}\text{C}$ | -65 $^{\circ}\text{C}$ to +200 $^{\circ}\text{C}$ |
| Soldering Temperature (10 sec. time limit) | 260 $^{\circ}\text{C}$ | 260 $^{\circ}\text{C}$ |
| Continuous Collector Current, $I_C \text{ max}$ | 200mA | 200mA |
| Continuous Base Current, $I_B \text{ max}$ | 50mA | 50mA |
| Collector-Emitter Voltage, V_{CES} | 32V | 45V |
| Collector-Emitter Voltage, V_{CEO} | 32V | 45V |
| Emitter-Base Voltage, V_{EBO} | 7V | 7V |

ELECTRICAL CHARACTERISTICS @ $T_A=25^{\circ}\text{C}$ (unless otherwise stated) :

| PARAMETER | SYMBOL | BCY 58 | | | BCY 59 | | | UNIT | TEST CONDITIONS |
|--------------------------------------|-------------------|--------|-----|-----|--------|-----|-----|---------------|---|
| | | MIN | TYP | MAX | MIN | TYP | MAX | | |
| Collector-Emitter Break-down Voltage | BV_{CES} | 32 | | | 45 | | | V | $I_C=10\mu\text{A}$ $I_B=0$ |
| Collector-Emitter Break-down Voltage | LV_{CEO} | 32 | | | 45 | | | V | $I_C=2\text{mA}$ $I_B=0$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 7 | | | 7 | | | V | $I_E=1\mu\text{A}$ $I_C=0$ |
| Collector-Emitter Cutoff Current | I_{CES} | | | 10 | | | | nA | $V_{\text{CE}}=32\text{V}$ $I_B=0$ |
| Collector-Emitter Cutoff Current | I_{CES} | | | | | 10 | | nA | $V_{\text{CE}}=45\text{V}$ $I_B=0$ |
| Collector-Emitter Cutoff Current | I_{CES} | | | 10 | | | | μA | $V_{\text{CE}}=32\text{V}$ $I_B=0$ $T_A=150^{\circ}\text{C}$ |

| PARAMETER | SYMBOL | BCY 58 | | | BCY 59 | | | UNIT | TEST CONDITIONS |
|--------------------------------------|---------------|--------|------|------|--------|------|------|------|---|
| | | MIN | TYP | MAX | MIN | TYP | MAX | | |
| Collector-Emitter Cutoff Current | I_{CES} | | | | | | 10 | uA | $V_{CE}=45V$ $T_A=150^\circ C$ $I_B=0$ |
| Collector-Emitter Cutoff Current | I_{CEV} | | | 20 | | | | uA | $V_{CE}=32V$ $T_A=100^\circ C$ $V_{BE}=0.2V$ |
| Collector-Emitter Cutoff Current | I_{CEV} | | | | | | 20 | uA | $V_{CE}=45V$ $T_A=100^\circ C$ $V_{BE}=0.2V$ |
| Emitter-Base Cutoff Current | I_{EBO} | | | 10 | | | 10 | nA | $V_{EB}=5V$ $I_C=0$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | | 0.1 | 0.35 | | | | V | $I_C=10mA$ $I_B=0.25mA$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | | | | | 0.7 | | V | $I_C=100mA$ $I_B=2.5mA$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | 0.6 | 0.7 | 0.85 | 0.6 | 0.7 | 0.85 | V | $I_C=10mA$ $I_B=0.25mA$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | 0.75 | 0.9 | 1.2 | 0.75 | 0.9 | 1.2 | V | $I_C=100mA$ $I_B=2.5mA$ |
| Base-Emitter Voltage | V_{BE} | | 0.5 | | | 0.5 | | V | $V_{CE}=5V$ $I_C=10uA$ |
| Base-Emitter Voltage | V_{BE} | 0.55 | 0.6 | 0.7 | 0.55 | 0.6 | 0.7 | V | $V_{CE}=5V$ $I_C=2mA$ |
| Base-Emitter Voltage | V_{BE} | | 0.7 | | | 0.7 | | V | $V_{CE}=1V$ $I_C=10mA$ |
| Base-Emitter Voltage | V_{BE} | | 0.75 | | | 0.75 | | V | $V_{CE}=1V$ $I_C=100mA$ |
| D.C. Current Gain | h_{FE} | 120 | | 630 | 120 | | 630 | | $V_{CE}=5V$ $I_C=2mA$ |
| D.C. Current Gain | h_{FE} | 80 | | 1000 | 80 | | 1000 | | $V_{CE}=1V$ $I_C=10mA$ |
| Transition Frequency | f_T | 120 | 250 | | 120 | 250 | | MHz | $V_{CE}=5V$ $I_C=10mA$ $f=100MHz$ |
| Collector-Base Capacitance | C_{CB} | | | 6 | | | 6 | pF | $V_{CB}=10V$ $f=1MHz$ |
| Emitter-Base Capacitance | C_{EB} | | | 15 | | | 15 | pF | $V_{EB}=0.5V$ $f=1MHz$ |
| Noise Figure | N.F. | | 2 | 6 | | 2 | 6 | db | $V_{CE}=5V$ $I_C=0.2mA$ $R_g=2Kohm$ $f=1KHz$ $BW=200Hz$ |

D.C. CURRENT GROUPINGS : BCY58/59 -7 BCY58/59 -8 BCY58/59 -9 BCY58/59-10

| GROUP TEST CONDITIONS | | BCY 58A BCY 59A | | BCY 58B BCY 59B | | BCY 58C BCY 59C | | BCY 58D BCY 59D | |
|--------------------------|---------------|--------------------|-----|--------------------|-----|--------------------|-----|--------------------|------|
| | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| $V_{CE}=5V$ | $I_C=10\mu A$ | | | 20 | | 40 | | 100 | |
| $V_{CE}=5V$ | $I_C=2mA$ | 120 | 220 | 180 | 310 | 250 | 460 | 380 | 630 |
| $V_{CE}=1V$ | $I_C=10mA$ | 80 | | 120 | 400 | 160 | 630 | 240 | 1000 |
| $V_{CE}=1V$ | $I_C=100mA$ | 40 | | 45 | | 60 | | 60 | |

SWITCHING CHARACTERISTICS :

| PARAMETER | SYMBOL | TYP | MAX | UNIT | TEST CONDITIONS |
|---------------|-----------|-----|-----|------|---------------------------------|
| Delay Time | t_d | 35 | | ns | $I_C=10mA$ $I_B=1mA$ |
| Rise Time | t_r | 50 | | ns | $I_{BM}=1mA$ $R_1=5K\Omega$ |
| Turn-On Time | t_{on} | 85 | 150 | ns | $R_2=5K\Omega$ $R_L=990\Omega$ |
| Storage Time | t_s | 400 | | ns | $V_{BB}=3.6V$ |
| Fall Time | t_f | 80 | | ns | |
| Turn-off Time | t_{off} | 480 | 800 | ns | |
| Delay Time | t_d | 5 | | ns | $I_C=100mA$ $I_B=10mA$ |
| Rise Time | t_r | 50 | | ns | $I_{BM}=10mA$ $V_{BB}=5V$ |
| Turn-On Time | t_{on} | 55 | 150 | ns | $R_1=500\Omega$ $R_2=700\Omega$ |
| Storage Time | t_s | 250 | | ns | $R_L=98\Omega$ |
| Fall Time | t_f | 200 | | ns | |
| Turn-off Time | t_{off} | 450 | 800 | ns | |

TYPICAL TWO PRRT CHARACTERISTICS (h parameter) @ $V_{CE}=5V$ $I_C=2mA$ $f=1KHz$:

| PARAMETER | TYPE | A (-7) | | | B (-8) | | | C (-9) | | | D (-10) | | | UNIT |
|-----------|------|--------|-----|-----|--------|-----|-----|--------|-----|-----|---------|-----|-----|-------|
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| h_{fe} | | 125 | 200 | 250 | 175 | 260 | 350 | 250 | 330 | 500 | 350 | 520 | 700 | |
| h_{ie} | | 1.6 | 2.7 | 4.5 | 2.5 | 3.6 | 6 | 3.2 | 4.5 | 8.5 | 4.5 | 7.5 | 12 | Kohm |
| h_{oe} | | | 18 | 30 | | 24 | 50 | | 30 | 60 | | 50 | 100 | umhos |
| h_{re} | | | 1.5 | | | 2 | | | 2 | | | 3 | | |