NPN Transistor Bare Die, 2N6045

Rev 1.0
12/07/23

Darlington construction transistor in bare die form Complement to PNP 2N6042

Features:

- Collector current up to 8A
- Very high current gain
- Enables high impedance circuitry
- Solderable Back Metal
- High Reliability tested grades for Military + Space

Ordering Information:

The following part suffixes apply:

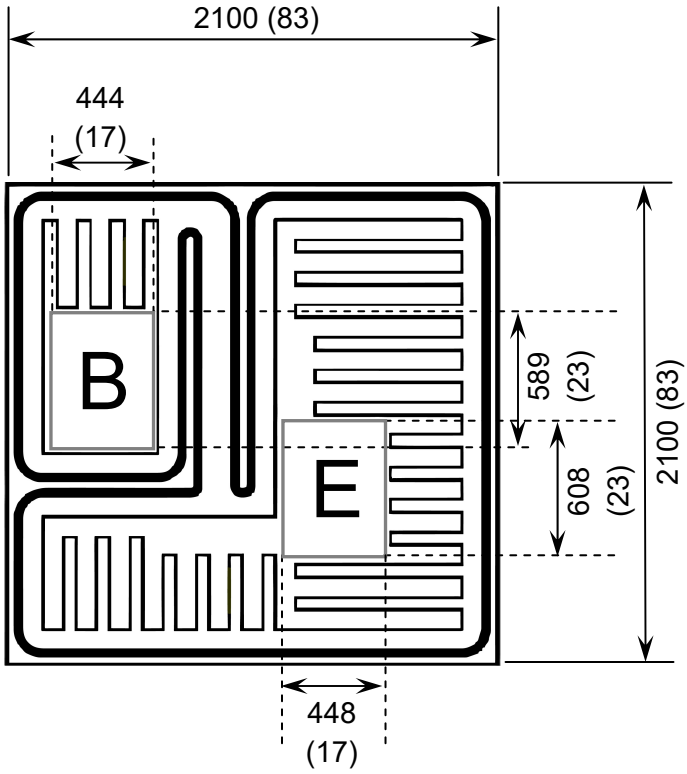
- No suffix - Commercial grade die
- "**H**" – Hi-rel grade die + MIL-STD-38534 Class H LAT
- "**K**" – Hi-rel grade die + MIL-STD-38534 Class K LAT.

LAT = Lot acceptance Test.

For information on Hi-Rel LAT flows please see below.

www.siliconsupplies.com\bare-die-lot-qualification

Die Dimensions in µm (mils)



DIE BACK = COLLECTOR

Supply Formats:

- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – Specific request
- Unsawn Wafer – Specific request
- With additional electrical selection – Specific request
- Sawn as pairs or adjacent pair pick – Specific request

Mechanical Specification

Die Size (Excluding Saw Street)	2100 x 2100 83 x 83	µm mils
Base Pad Size	444 x 589 17 x 23	µm mils
Emitter Pad Size	448 x 608 17 x 23	µm mils
Die Thickness	260 (±20) 10 (±0.79)	µm mils
Top Metal Composition	Al	
Back Metal Composition	Ti/Ni/Ag	

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Absolute Maximum Ratings T_A = 25°C unless otherwise stated

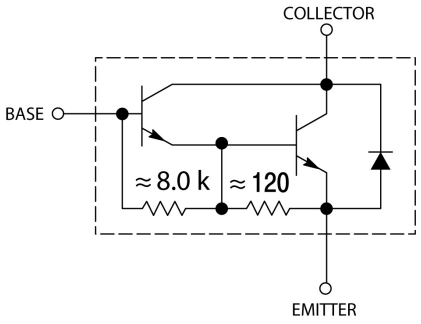
PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	100	V
Collector-Emitter Voltage	V_{CEO}	100	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current	I_C	8	A
Base Current	I_B	120	mA
Junction Temperature	T_J	150	°C
Storage Temperature	T_{stg}	-55 to 150	°C

Electrical Characteristics T_A = 25°C unless otherwise stated

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 100mA	100	-	-	V
Collector-Emitter Breakdown Voltage	$V_{CEO(SUS)}$	I_C = 30mA, I_B = 0	100	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 100µA	5	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = 100V, I_E = 0	-	-	500	µA
	I_{CEO}	V_{CE} = 50V, I_B = 0	-	-	500	µA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 5V, I_C = 0	-	-	2	mA
ON CHARACTERISTICS						
DC Current Gain	h_{FE}	I_C = 3A, V_{CE} = 4V	1000	-	20000	-
		I_C = 8A, V_{CE} = 4V	100	-	-	-
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C = 3A, I_B = 12mA	-	-	2	V
		I_C = 8A, I_B = 80mA	-	-	4	V
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	I_C = 8A, I_B = 80mA	-	-	4.5	V
Base-Emitter On Voltage	$V_{BE(ON)}$	I_C = 4A, V_{CE} = 4V	-	-	2.8	V
SMALL-SIGNAL CHARACTERISTICS[1]						
Small-Signal Current Gain	$\|h_{fe}\|$	V_{CE} = 4V, I_C = 3A, f = 1 MHz	4	-	-	-
Output Capacitance	C_{obo}	V_{CB} = 10V, I_E = 1A, f = 0.1 MHz	-	-	300	pF
Small-Signal Current Gain	h_{fe}	V_{CE} = 4V, I_C = 3A, f = 1 KHz	300	-	-	-

1. Not production testing in die form, characterized by chip design and tested in package.

Internal NPN Schematic Diagram



Typical Electrical Characteristics

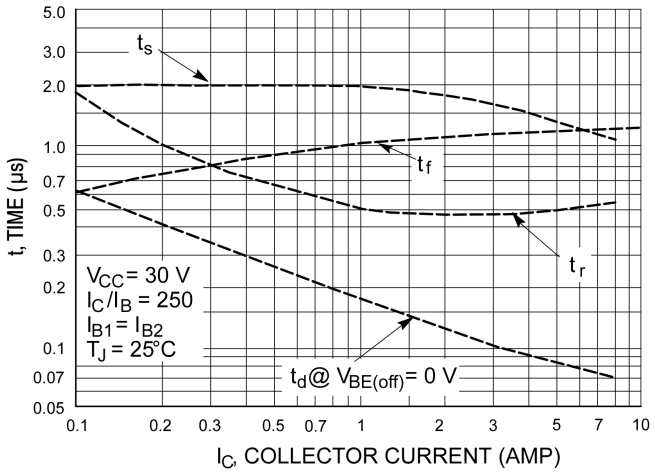


Figure 1 – Switching Times

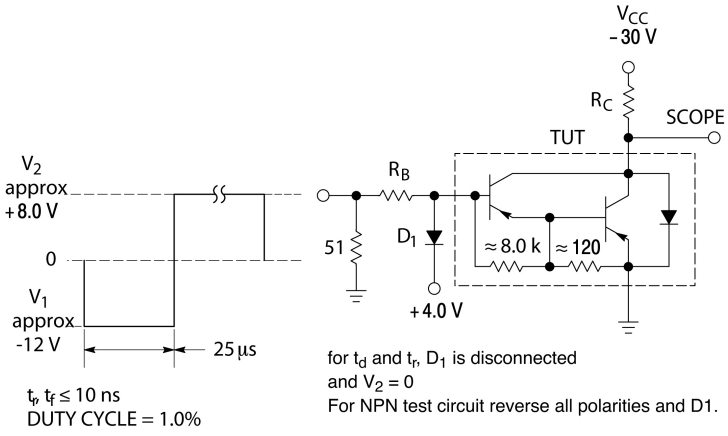


Figure 2 – Switching Times Test Circuit
(PNP – follow notes for NPN)

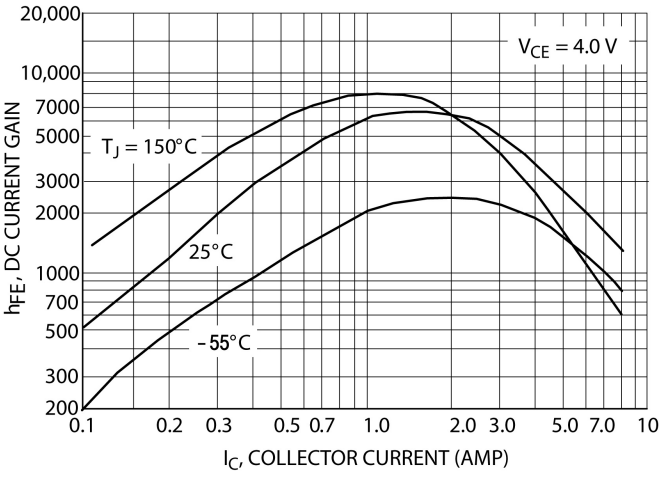


Figure 4 – DC Current Gain

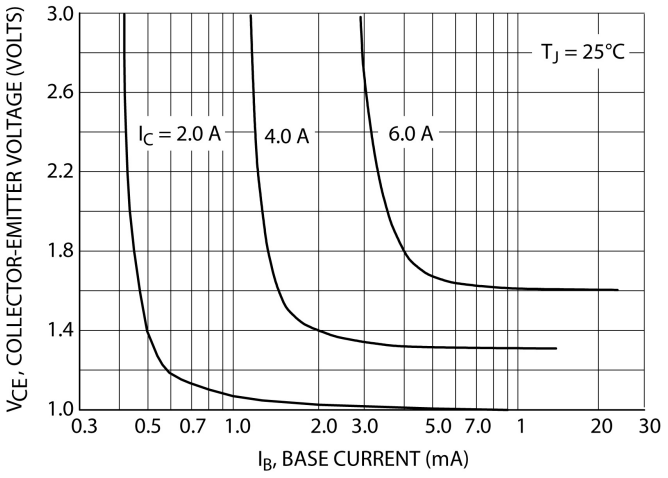


Figure 5 – Collector Saturation Region

Typical Electrical Characteristics

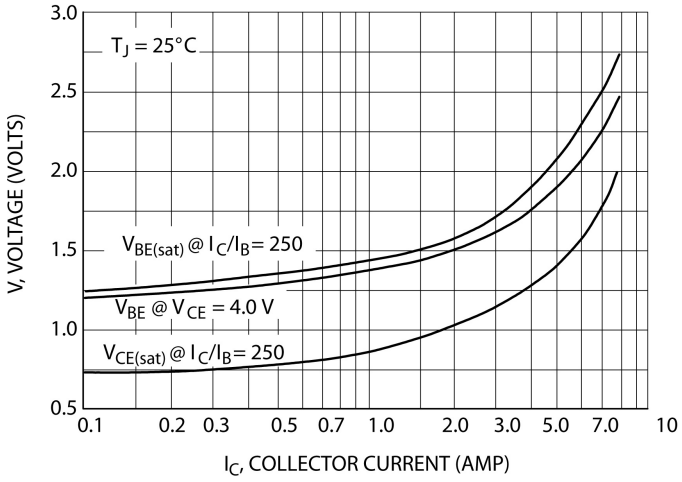


Figure 6 – "On" Voltages

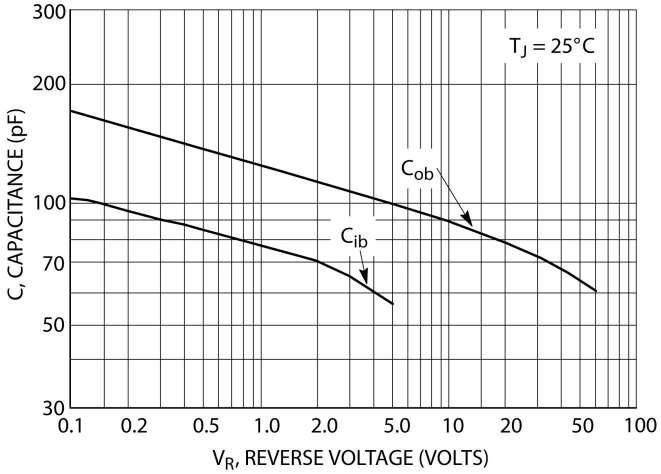


Figure 7 - Capacitance

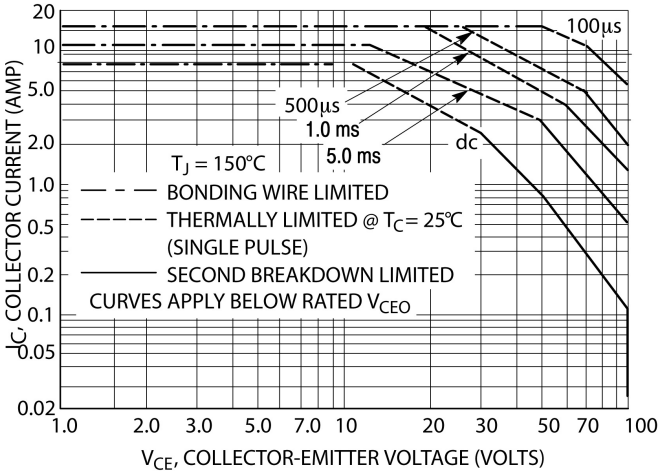


Figure 8 – Active-region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 8 is based on $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.