

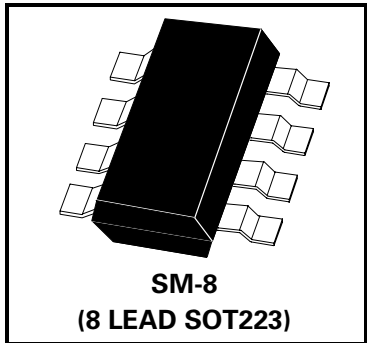
# SM-8 BIPOLAR TRANSISTOR H-BRIDGE

**ZHB6792**

PRELIMINARY DATA SHEET ISSUE A MAY 1998

## FEATURES

- \* Compact package
- \* Low on state losses
- \* Low drive requirements
- \* Operates up to 70V supply
- \* 1 Amp continuous rating

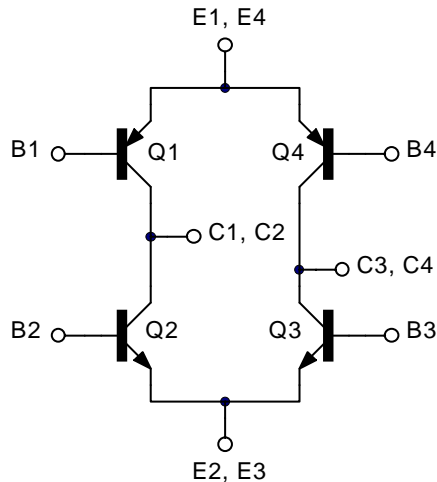


PARTMARKING DETAIL – ZHB6792

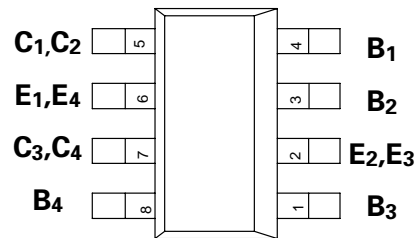
## ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	NPNs	PNPs	UNIT
Collector-Base Voltage	$V_{CBO}$	70	-70	V
Collector-Emitter Voltage	$V_{CEO}$	70	-70	V
Emitter-Base Voltage	$V_{EBO}$	5	-5	V
Peak Pulse Current	$I_{CM}$	2	-2	A
Continuous Collector Current	$I_C$	1	-1	A
Operating and Storage Temperature Range	$T_j; T_{stg}$	-55 to +150		°C

## SCHEMATIC DIAGRAM



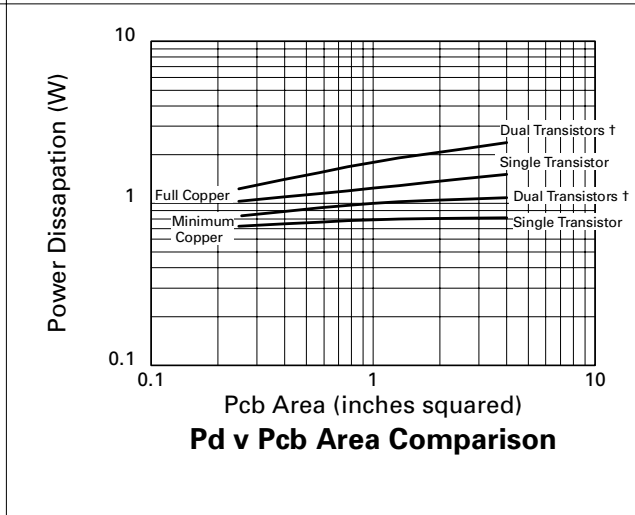
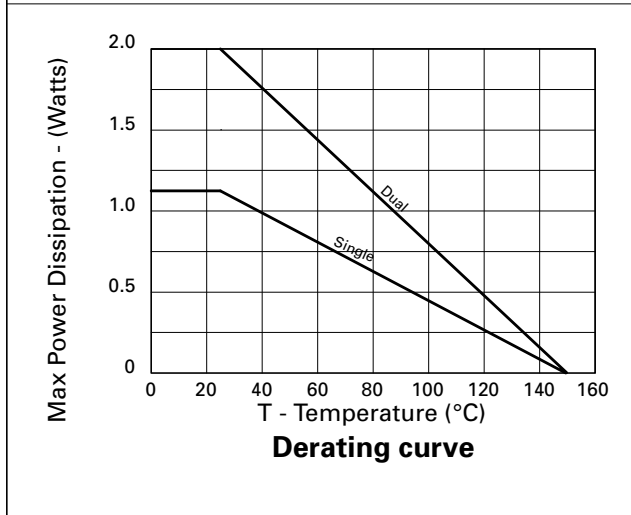
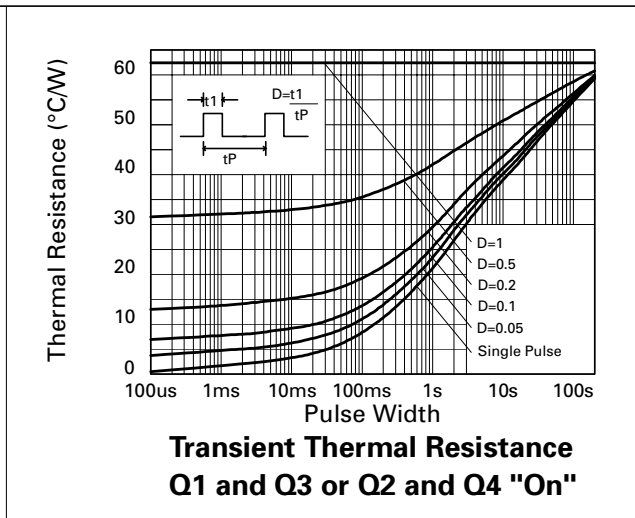
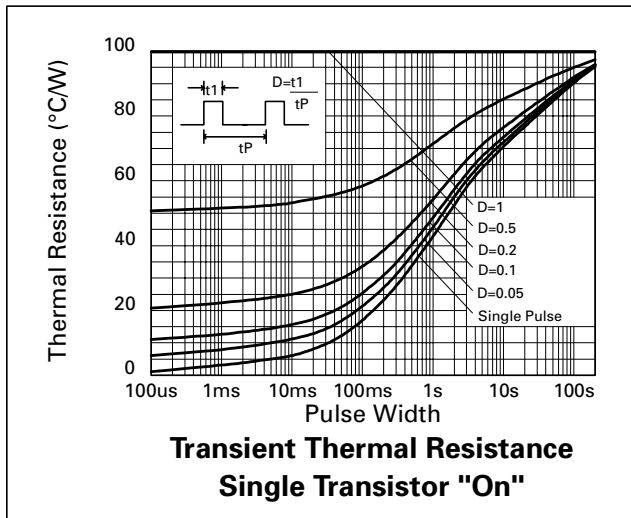
## CONNECTION DIAGRAM



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## THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	VALUE	UNIT
Total Power Dissipation at $T_{amb} = 25^{\circ}\text{C}^*$ Any single transistor "on" Q1 and Q3 "on" or Q2 and Q4 "on" equally	$P_{tot}$	1.25 2	W W
Derate above $25^{\circ}\text{C}^*$ Any single transistor "on" Q1 and Q3 "on" or Q2 and Q4 "on" equally		10 16	mW/ $^{\circ}\text{C}$ mW/ $^{\circ}\text{C}$
Thermal Resistance - Junction to Ambient* Any single transistor "on" Q1 and Q3 "on" or Q2 and Q4 "on" equally		100 62.5	$^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$



\* The power which can be dissipated assuming the device is mounted in a typical manner on a PCB with copper equal to 2 inches square.

† "Two devices on" is the standard operating condition for the bridge. Eg. opposing NPN/PNP pairs turned on.

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## NPN TRANSISTORS ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS.
Breakdown Voltages	$V_{(BR)CBO}$	70			V	$I_C=100\mu\text{A}$
	$V_{(BR)CEO}$	70			V	$I_C=10\text{mA}^*$
	$V_{(BR)EBO}$	5			V	$I_E=100\mu\text{A}$
Cut-Off Currents	$I_{CBO}$			0.1	$\mu\text{A}$	$V_{CB}=55\text{V}$
	$I_{EBO}$			0.1	$\mu\text{A}$	$V_{EB}=4\text{V}$
Saturation Voltages	$V_{CE(sat)}$			0.15 0.5	V V	$I_C=0.1\text{A}, I_B=0.5\text{mA}^*$ $I_C=1\text{A}, I_B=10\text{mA}^*$
	$V_{BE(sat)}$			0.9	V	$I_C=1\text{A}, I_B=10\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			0.9	V	$I_C=1\text{A}, V_{CE}=2\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	500 400 150				$I_C=100\text{mA}, V_{CE}=2\text{V}^*$ $I_C=500\text{mA}, V_{CE}=2\text{V}^*$ $I_C=1\text{A}, V_{CE}=2\text{V}^*$
Transition Frequency	$f_T$	150			MHz	$I_C=50\text{mA}, V_{CE}=5\text{V}, f=50\text{MHz}$
Input Capacitance	$C_{ibo}$		200		pF	$V_{EB}=0.5\text{V}, f=1\text{MHz}$
Output Capacitance	$C_{obo}$		12		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$
Switching Times	$t_{on}$		46		ns	$I_C=500\text{mA}, I_{B1}=50\text{mA}$
	$t_{off}$		1440		ns	$I_{B2}=50\text{mA}, V_{CC}=10\text{V}$

\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

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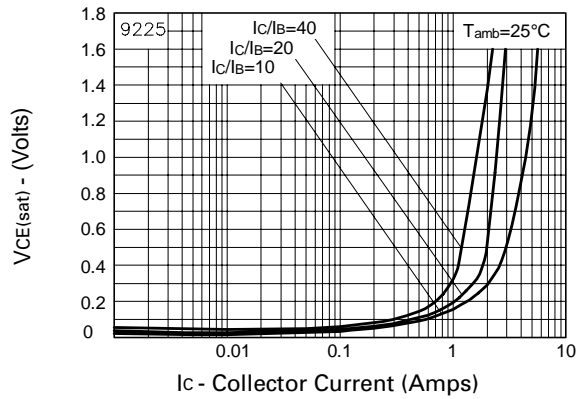
## PNP TRANSISTORS ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-75			V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-70			V	$I_C = -10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5			V	$I_E = -100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			-0.1	$\mu\text{A}$	$V_{CB} = -40\text{V}$
Emitter Cut-Off Current	$I_{EBO}$			-0.1	$\mu\text{A}$	$V_{EB} = -4\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			-0.45 -0.5	V V	$I_C = -500\text{mA}, I_B = -5\text{mA}^*$ $I_C = -1\text{A}, I_B = -25\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			-0.95	V	$I_C = -1\text{A}, I_B = -25\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		-0.75		V	$I_C = -1\text{A}, V_{CE} = -2\text{V}^*$
Static Forward Current Transfer	$h_{FE}$	300 250 200		800		$I_C = -10\text{mA}, V_{CE} = -2\text{V}^*$ $I_C = -500\text{mA}, V_{CE} = -2\text{V}^*$ $I_C = -1\text{A}, V_{CE} = -2\text{V}^*$
Transition Frequency	$f_T$	100			MHz	$I_C = -50\text{mA}, V_{CE} = -5\text{V}$ $f = 50\text{MHz}$
Input Capacitance	$C_{ibo}$		225		pF	$V_{EB} = -0.5\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{obo}$		22		pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Switching Times	$t_{on}$ $t_{off}$		35 750		ns ns	$I_C = -500\text{mA},$ $I_{B1} = -50\text{mA}$ $I_{B2} = -50\text{mA}, V_{CC} = -10\text{V}$

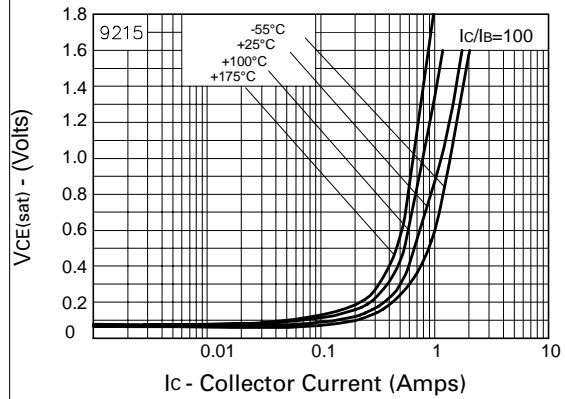
\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

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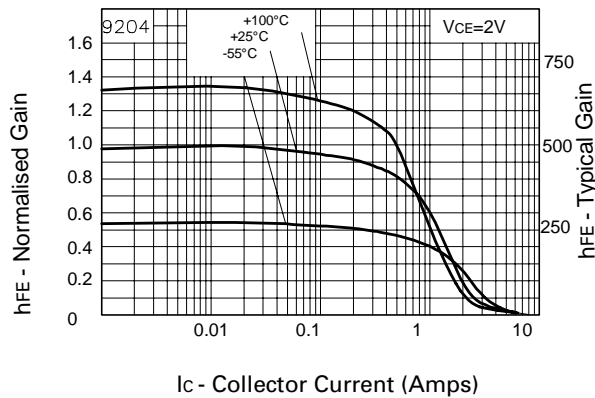
# PNP TRANSISTOR TYPICAL CHARACTERISTICS



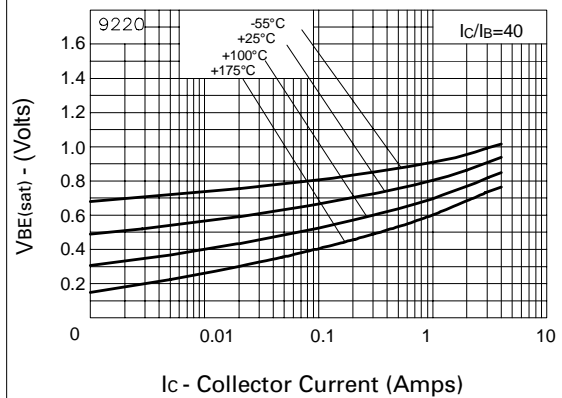
VCE(sat) v IC



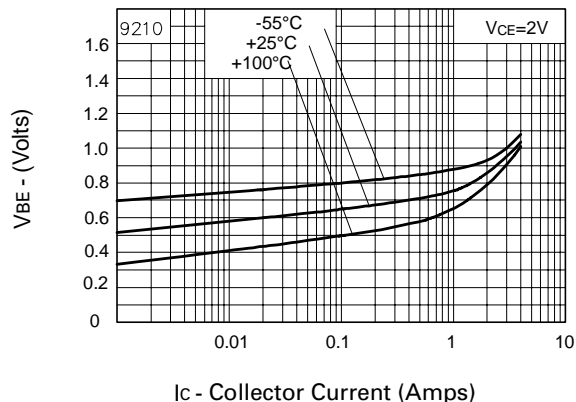
VCE(sat) v IC



hFE v IC



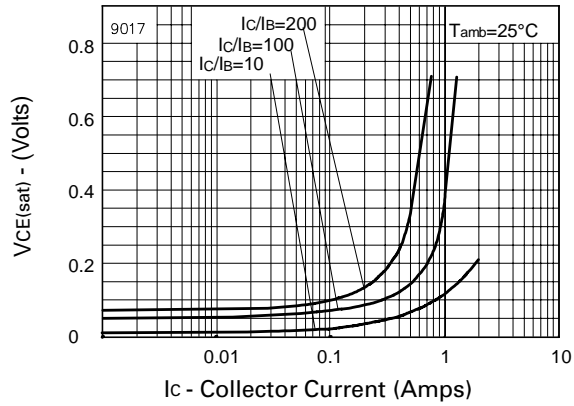
VBE(sat) v IC



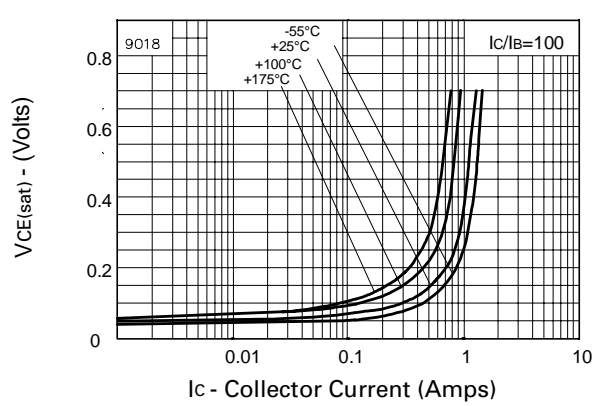
VBE(on) v IC

# ZHB6792

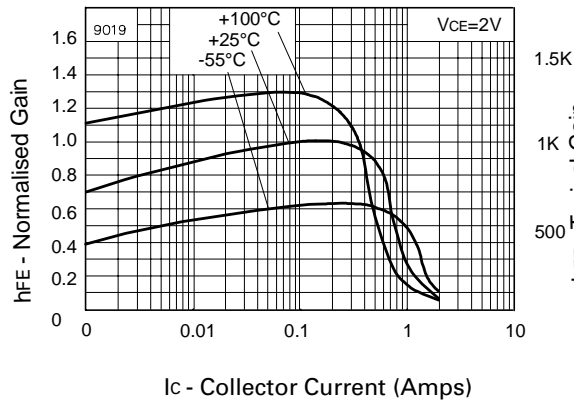
## NPN TRANSISTOR TYPICAL CHARACTERISTICS



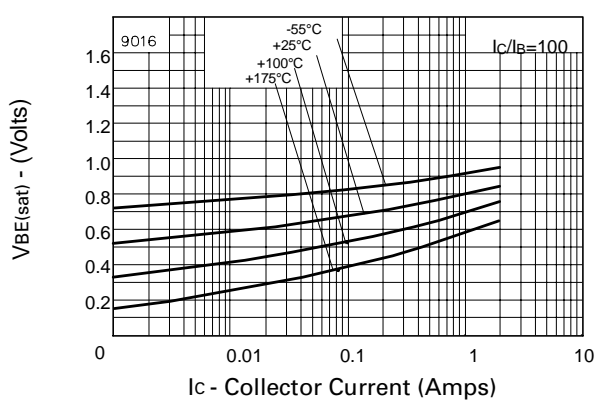
**VCE(sat) v IC**



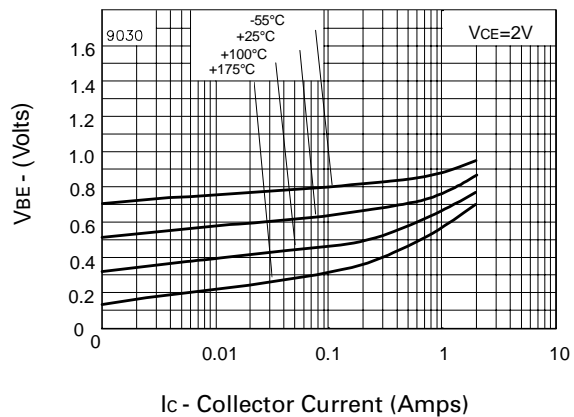
**VCE(sat) v IC**



**hFE v IC**

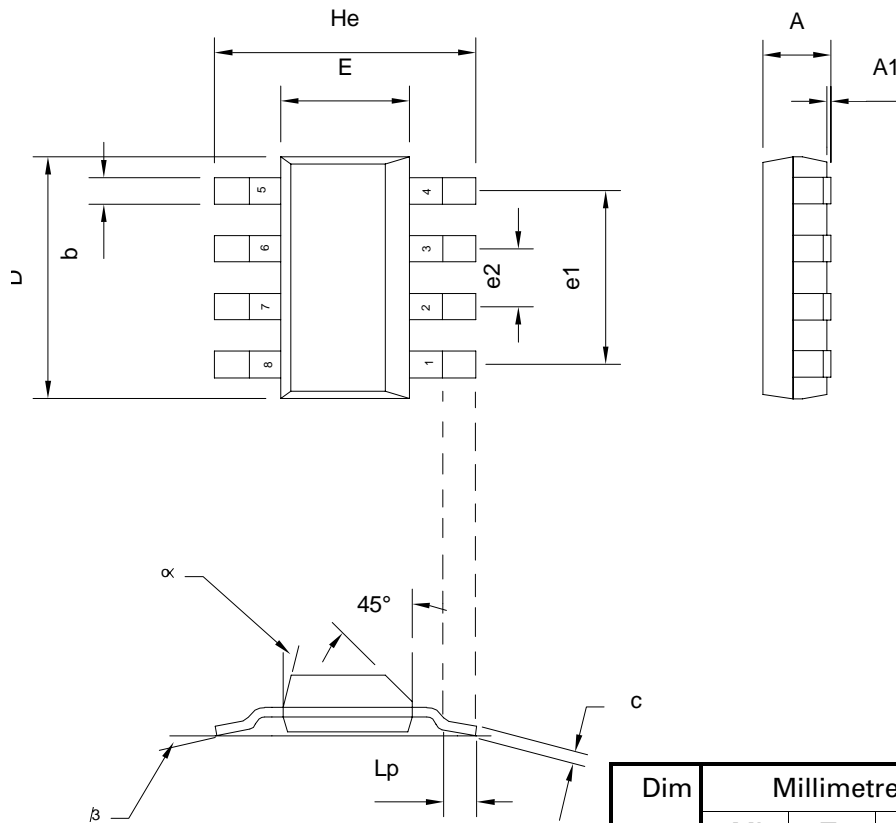


**VBE(sat) v IC**



**VBE(on) v IC**

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Dim	Millimetres			Inches		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.7	-	-	0.067
A1	0.02	-	0.1	0.0008	-	0.004
b	-	0.7	-	-	0.028	-
c	0.24	-	0.32	0.009	-	0.013
D	6.3	-	6.7	0.248	-	0.264
E	3.3	-	3.7	0.130	-	0.145
e1	-	4.59	-	-	0.180	-
e2	-	1.53	-	-	0.060	-
He	6.7	-	7.3	0.264	-	0.287
Lp	0.9	-	-	0.035	-	-



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