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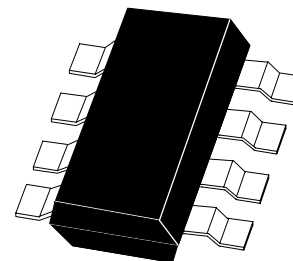
SM-8 BIPOLAR TRANSISTOR H-BRIDGE

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



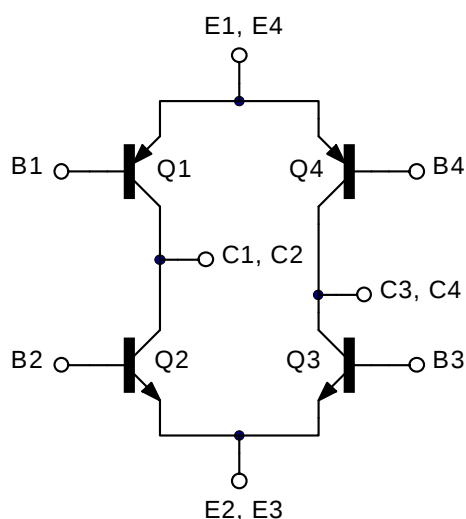
SM-8
(8 LEAD SOT223)

PARTMARKING DETAIL – ZHB6792

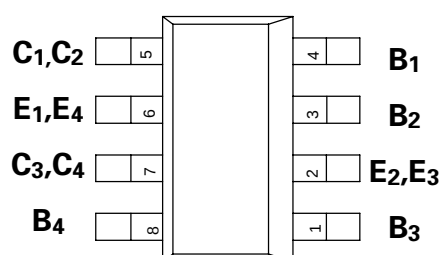
ABSOLUTE MAXIMUM RATINGS.

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



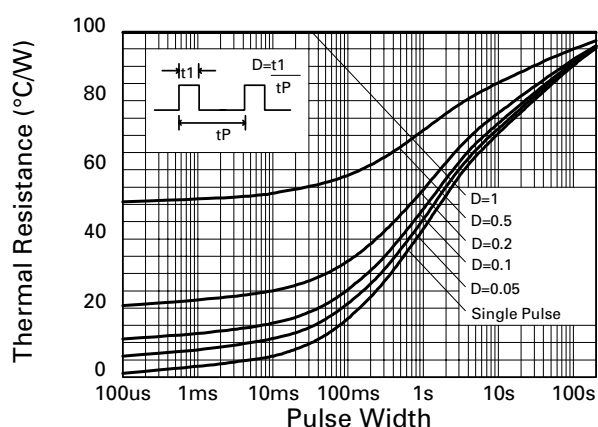
CONNECTION DIAGRAM



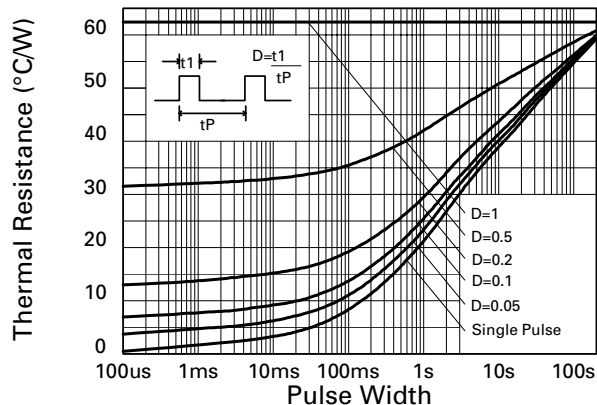
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THERMAL CHARACTERISTICS

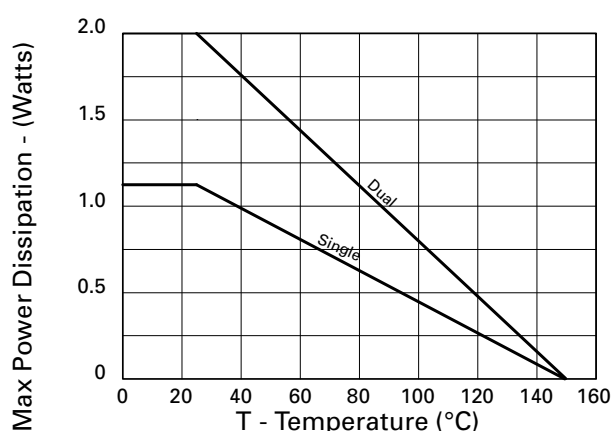
PARAMETER	SYMBOL	VALUE	UNIT
Total Power Dissipation at $T_{amb} = 25^{\circ}\text{C}^*$ Any single transistor "on" Q1 and Q3 "on" or Q2 and Q4 "on" equally	P_{tot}	1.25 2	W W
Derate above 25°C^* Any single transistor "on" Q1 and Q3 "on" or Q2 and Q4 "on" equally		10 16	mW/ $^{\circ}\text{C}$ mW/ $^{\circ}\text{C}$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



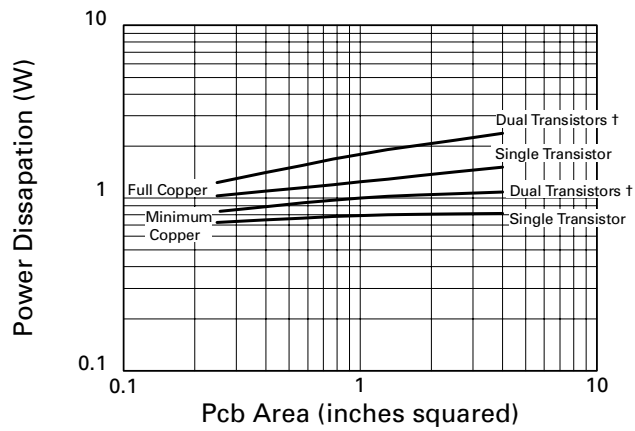
**Transient Thermal Resistance
Single Transistor "On"**



**Transient Thermal Resistance
Q1 and Q3 or Q2 and Q4 "On"**



Derating curve



Pd v Pcb Area Comparison

* 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	μA	$V_{CB}=55\text{V}$
	I_{EBO}			0.1	μA	$V_{EB}=4\text{V}$
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	$I_C=500\text{mA}, I_{B1}=50\text{mA}$ $I_{B2}=50\text{mA}, V_{CC}=10\text{V}$
	t_{off}		1440		ns	

*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$

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PNP TRANSISTORS

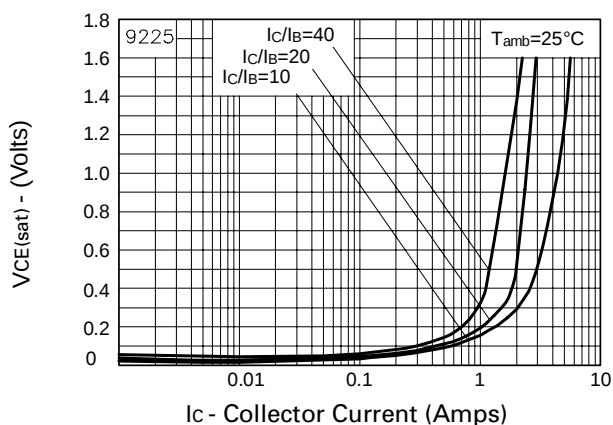
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$)

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	μA	$V_{CB} = -40\text{V}$
Emitter Cut-Off Current	I_{EBO}			-0.1	μA	$V_{EB} = -4\text{V}$
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	$I_C = -500\text{mA}$, $I_{B1} = -50\text{mA}$ $I_{B2} = -50\text{mA}$, $V_{CC} = -10\text{V}$

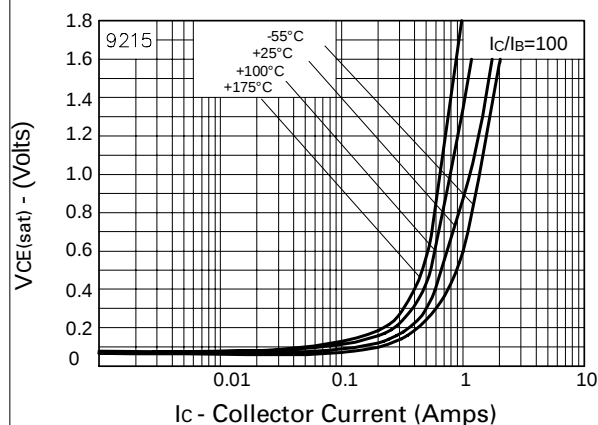
*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$

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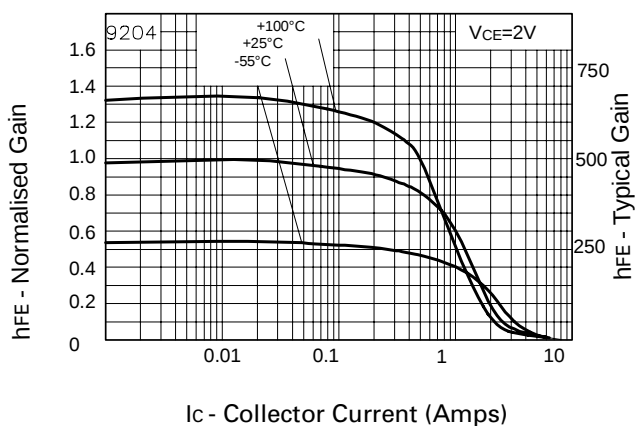
PNP TRANSISTOR TYPICAL CHARACTERISTICS



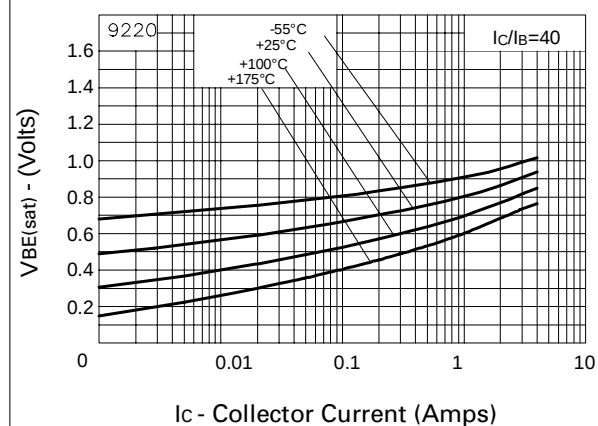
$V_{CE(sat)}$ v I_C



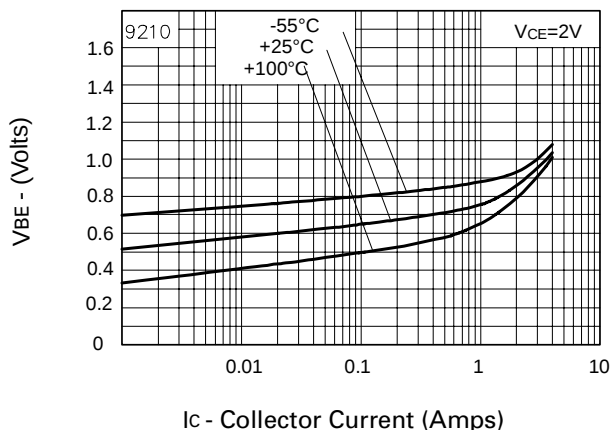
$V_{CE(sat)}$ v I_C



h_{FE} v I_C



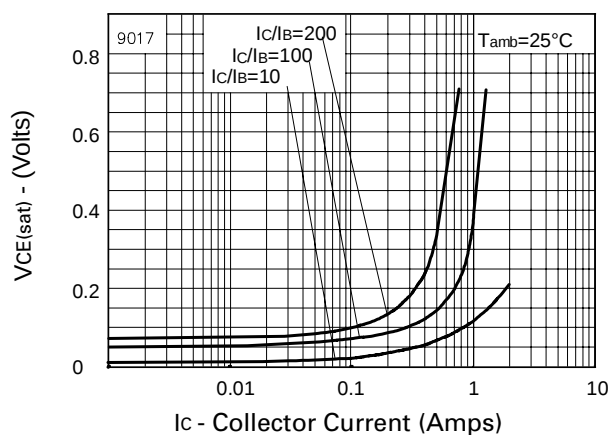
$V_{BE(sat)}$ v I_C



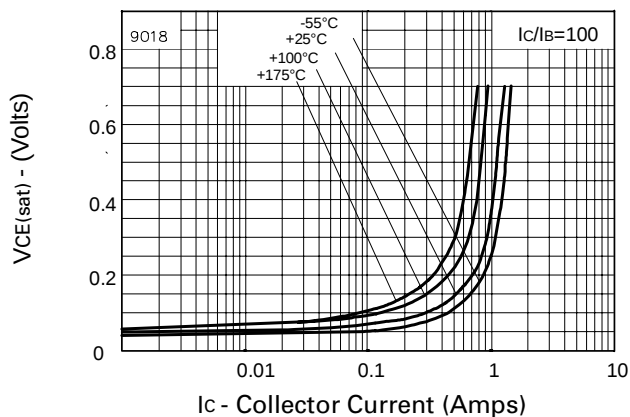
$V_{BE(on)}$ v I_C

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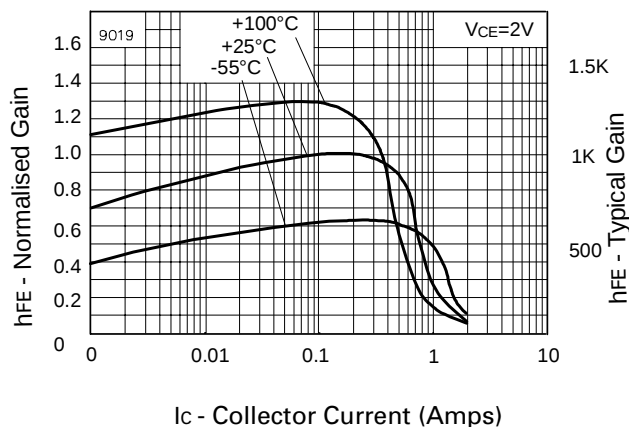
NPN TRANSISTOR TYPICAL CHARACTERISTICS



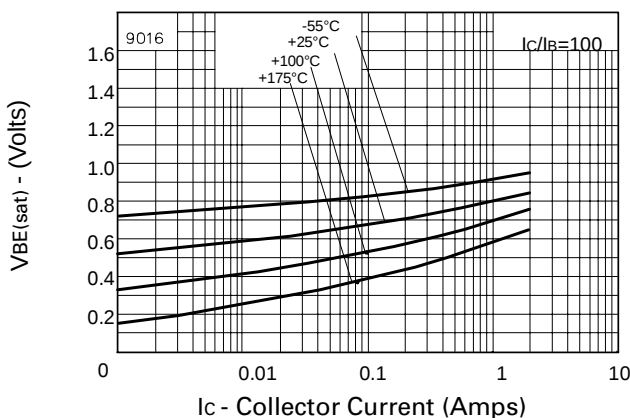
$V_{CE(sat)}$ v I_C



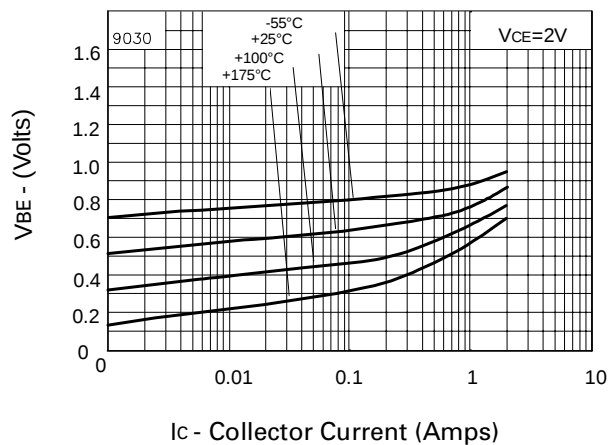
$V_{CE(sat)}$ v I_C



h_{FE} v I_C

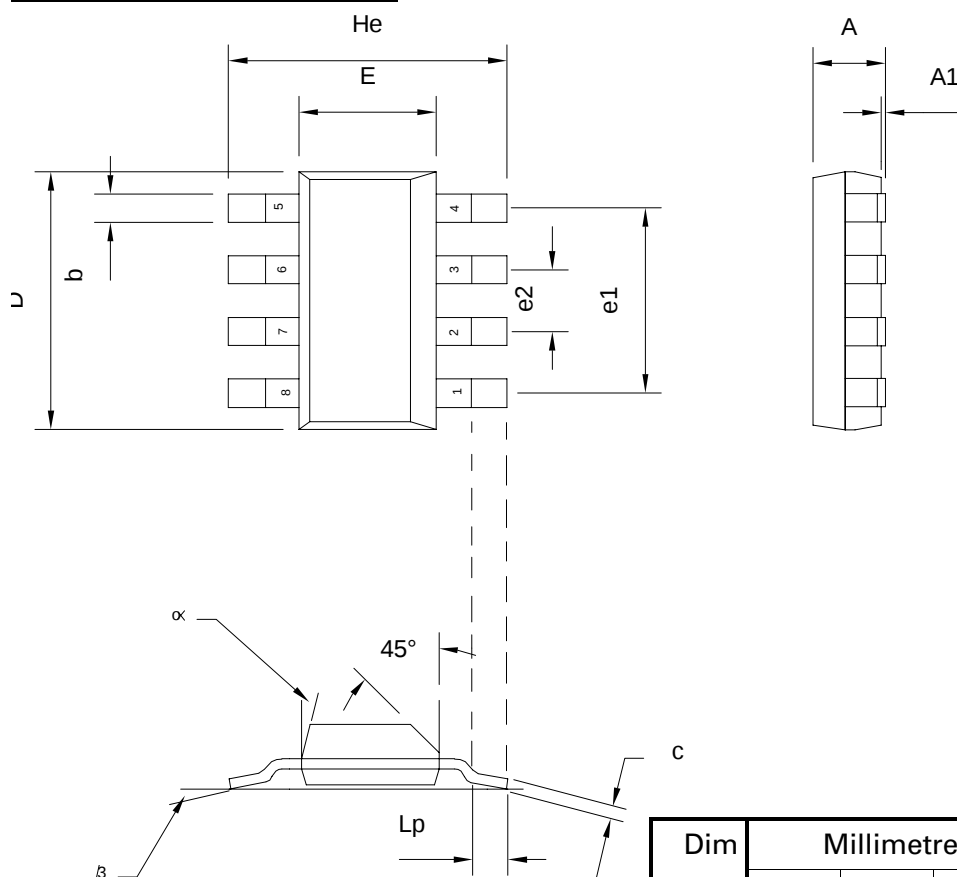


$V_{BE(sat)}$ v I_C



$V_{BE(on)}$ v I_C

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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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