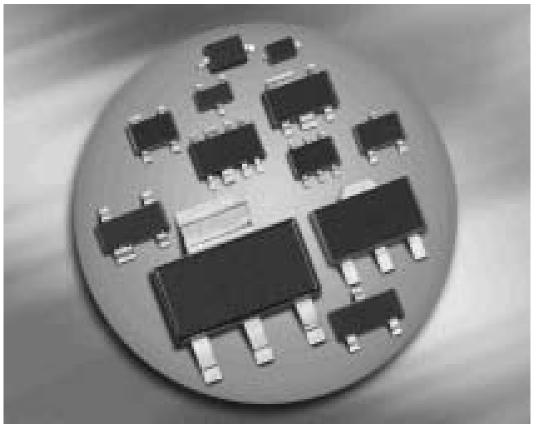
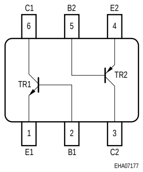
NPN / PNP Silicon Switching Transistor Array

- High current gain
- Low collector-emitter saturation voltage
- Two (galvanic) internal isolated NPN / PNP transistor in one package
- Pb-free (RoHS compliant) package 1)
- Qualified according AEC Q101

AEC Qualified RoHS



SMBT3904PN
SMBT3904UPN



Type	Marking	Pin Configuration						Package
SMBT3904PN	s3P	1=E	2=B	3=C	4=E	5=B	6=C	SOT363
SMBT3904UPN	s3P	1=E	2=B	3=C	4=E	5=B	6=C	SC74

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	40	V
Collector-base voltage	V_{CBO}	40	
Emitter-base voltage	V_{EBO}	6	
Collector current	I_C	200	mA
Total power dissipation-	P_{tot}		mW
$T_S \leq 115$ °C, SMBT3904PN		250	
$T_S \leq 105$ °C, SMBT3904UPN		330	
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-65 ... 150	

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[1] Pb-containing package may be available upon special request

Thermal Resistance

Parameter	**Symbol**	**Value**	**Unit**
Junction - soldering point[1]	R_{thJS}		K/W
SMBT3904PN		≤ 140	
SMBT3904UPN		≤ 135	

Electrical Characteristics at $T_A = 25°C$, unless otherwise specified

Parameter	**Symbol**	**Values**			**Unit**
		min.	**typ.**	**max.**	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 1$ mA, $I_B = 0$	$V_{(BR)CEO}$	40	-	-	V
Collector-base breakdown voltage $I_C = 10$ µA, $I_E = 0$	$V_{(BR)CBO}$	40	-	-	
Emitter-base breakdown voltage $I_E = 10$ µA, $I_C = 0$	$V_{(BR)EBO}$	6	-	-	
Collector-base cutoff current $V_{CB} = 30$ V, $I_E = 0$	I_{CBO}	-	-	50	nA
DC current gain[2]	h_{FE}				-
$I_C = 100$ µA, $V_{CE} = 1$ V		40	-	-	
$I_C = 1$ mA, $V_{CE} = 1$ V		70	-	-	
$I_C = 10$ mA, $V_{CE} = 1$ V		100	-	300	
$I_C = 50$ mA, $V_{CE} = 1$ V		60	-	-	
$I_C = 100$ mA, $V_{CE} = 1$ V		30	-	-	
Collector-emitter saturation voltage[2]	V_{CEsat}				V
$I_C = 10$ mA, $I_B = 1$ mA		-	-	0.25	
$I_C = 50$ mA, $I_B = 5$ mA		-	-	0.4	
Base emitter saturation voltage[2]	V_{BEsat}				
$I_C = 10$ mA, $I_B = 1$ mA		0.65	-	0.85	
$I_C = 50$ mA, $I_B = 5$ mA		-	-	0.95	

[1] For calculation of R_{thJA} please refer to Application Note Thermal Resistance

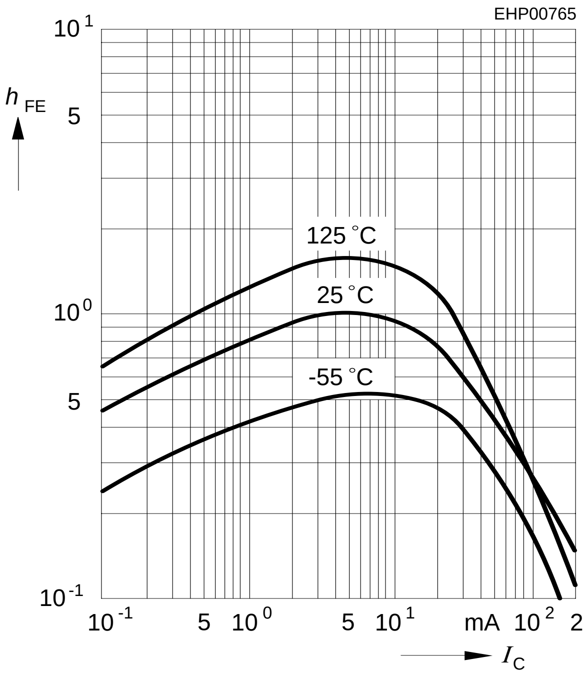
[2] Pulse test: t < 300µs; D < 2%

Electrical Characteristics at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency I_C = 10 mA, V_{CE} = 5 V, f = 100 MHz	f_T	250	-	-	MHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	-	3.5	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	-	10	
Delay time V_{CC} = 3 V, I_C = 10 mA, I_{B1} = 1 mA, $V_{BE(off)}$ = 0.5 V	t_d	-	-	35	ns
Rise time V_{CC} = 3 V, I_C = 10 mA, I_{B1} = 1 mA, $V_{BE(off)}$ = 0.5 V	t_r	-	-	35	
Storage time V_{CC} = 3 V, I_C = 10 mA, I_{B1} = I_{B2} = 1 mA	t_{stg}	-	-	225	
Fall time V_{CC} = 3 V, I_C = 10 mA, I_{B1} = I_{B2} = 1 mA	t_f	-	-	75	
Noise figure I_C = 100 µA, V_{CE} = 5 V, f = 1 kHz, Δf = 200 Hz, R_S = 1 kΩ	F	-	-	5	dB

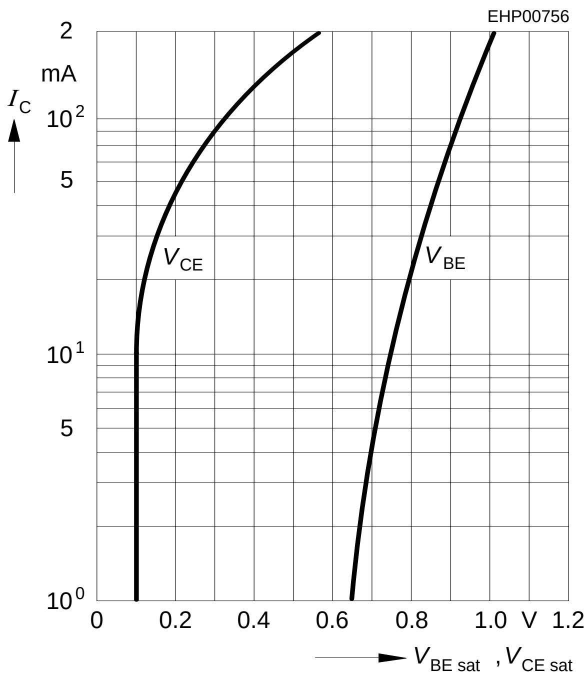
DC current gain $h_{FE} = f(I_C)$

V_{CE} = 10 V, normalized



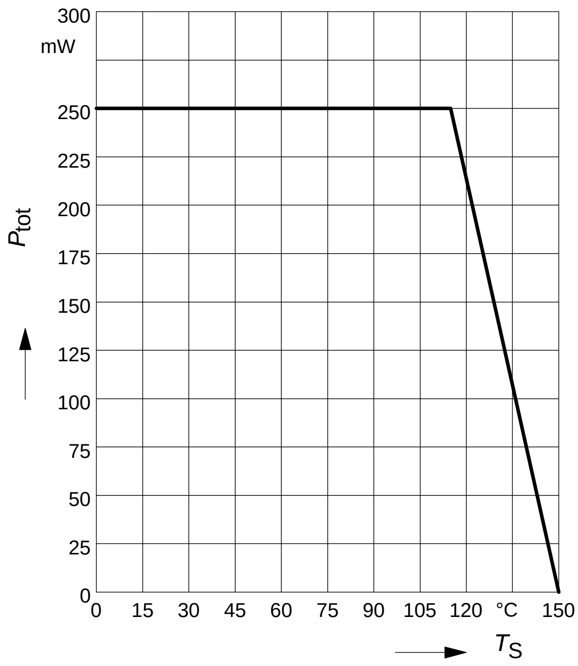
Saturation voltage $I_C = f(V_{BEsat}; V_{CEsat})$

h_{FE} = 10



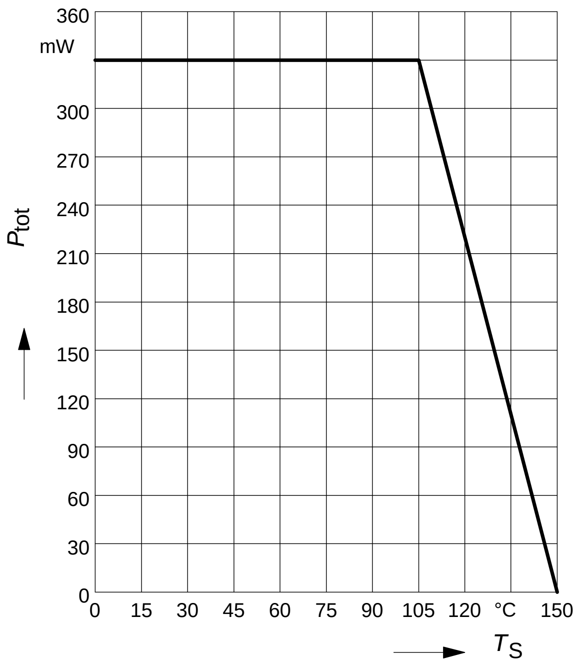
Total power dissipation $P_{tot} = f(T_S)$

SMBT3904PN



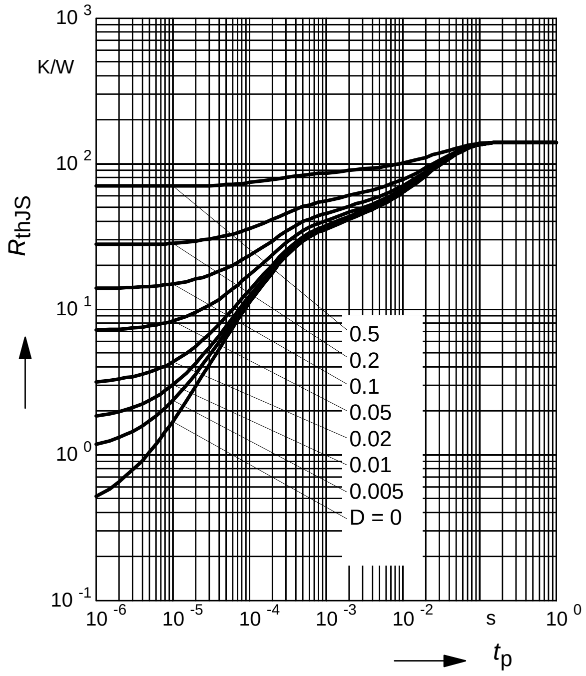
Total power dissipation $P_{tot} = f(T_S)$

SMBT3904UPN



Permissible Pulse Load $R_{thJS} = f(t_p)$

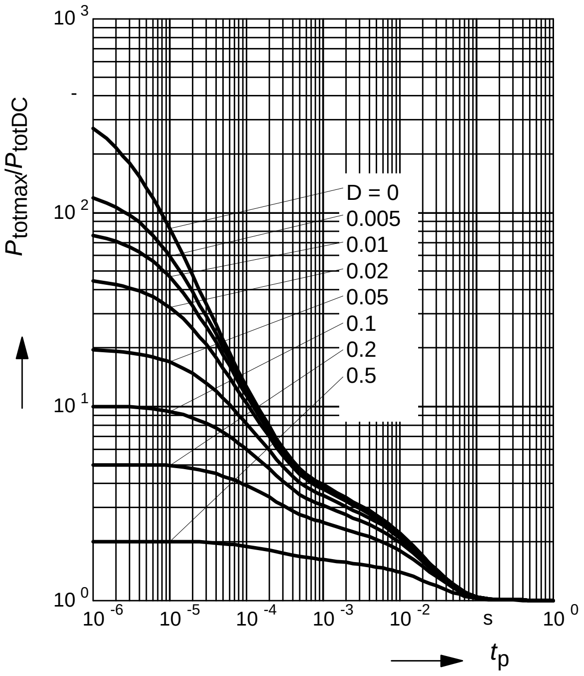
SMBT3904PN



Permissible Pulse Load

$P_{totmax}/P_{totDC} = f(t_p)$

SMBT3904PN



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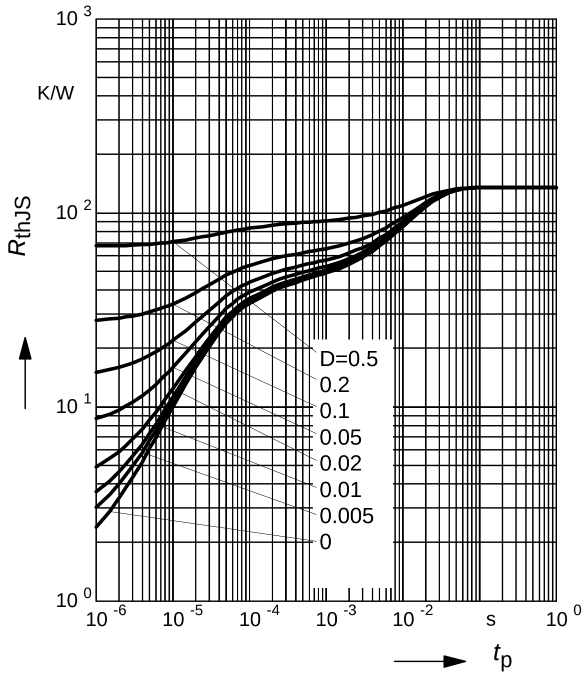
SMBT3904UPN



Permissible Pulse Load

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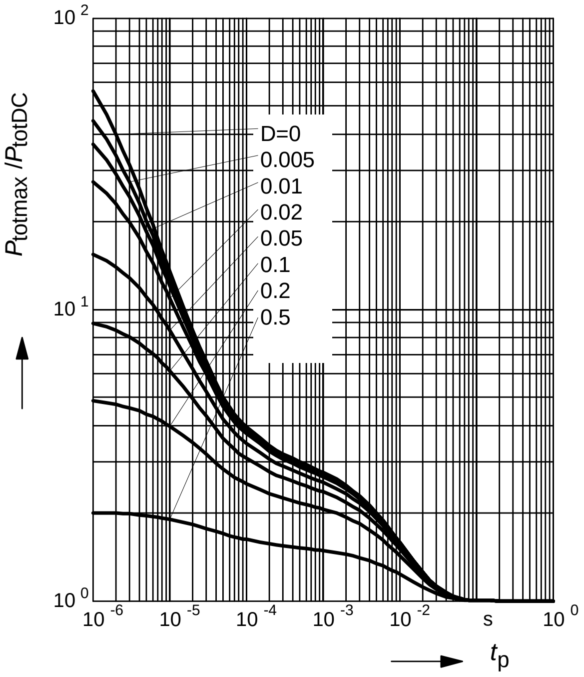
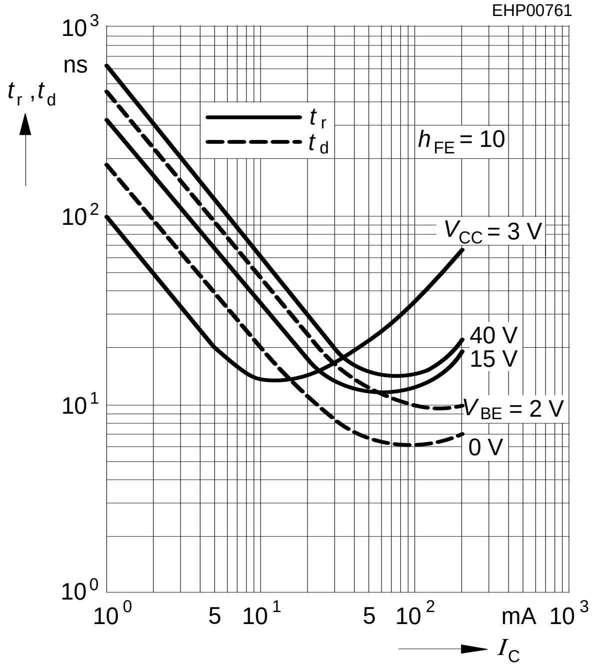
SMBT3904UPN

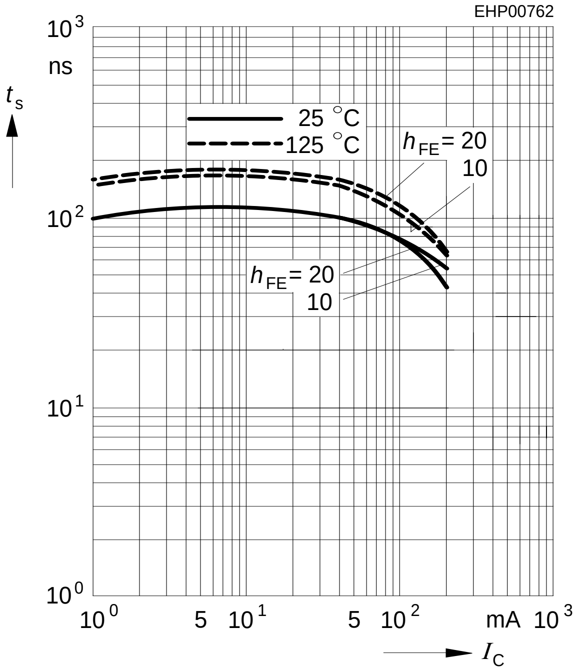


Delay time $t_d = f(I_C)$

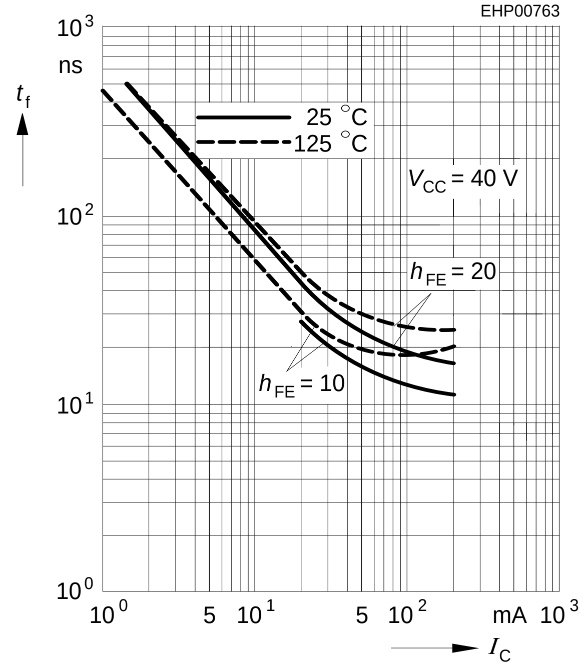
Rise time $t_r = f(I_C)$



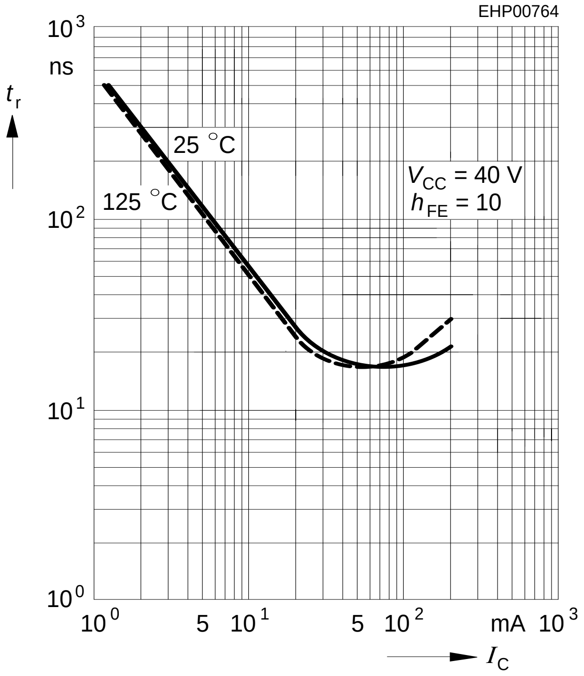
Storage time $t_{stg} = f(I_C)$



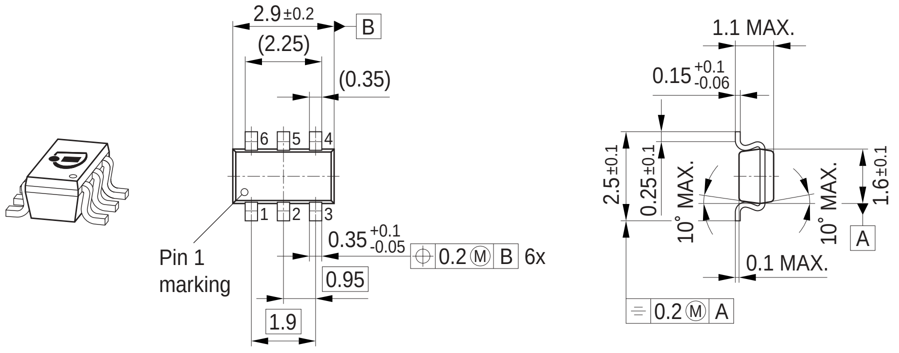
Fall time $t_f = f(I_C)$



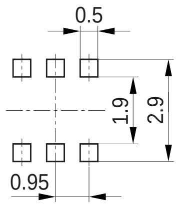
Rise time $t_r = f(I_C)$



Package Outline

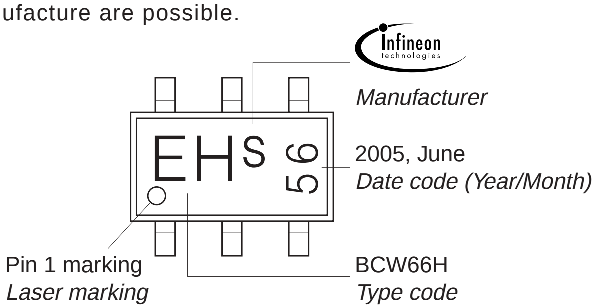


Foot Print



Marking Layout (Example)

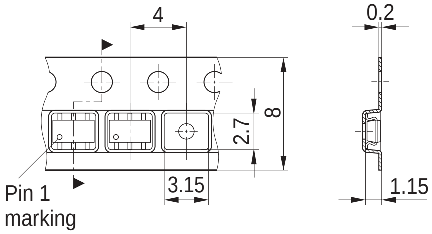
Small variations in positioning of
Date code, Type code and Manufacture are possible.



Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.



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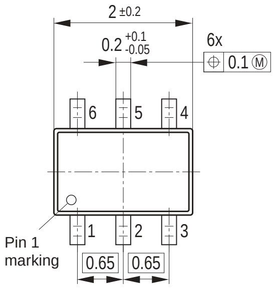

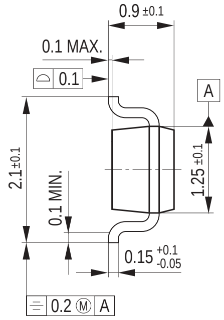

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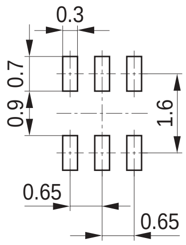

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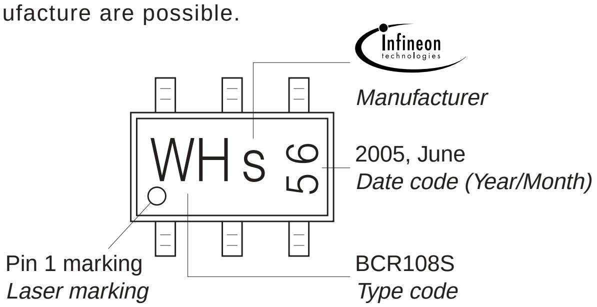

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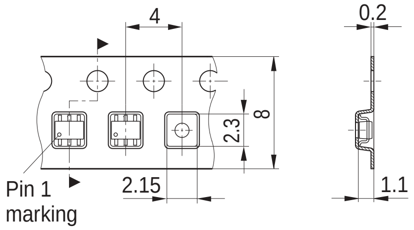

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