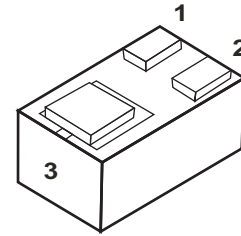


## TK3904LED03-HF (NPN)

RoHS Device  
Halogen Free



### Features

- Single General-Purpose switching transistor.

### Mechanical data

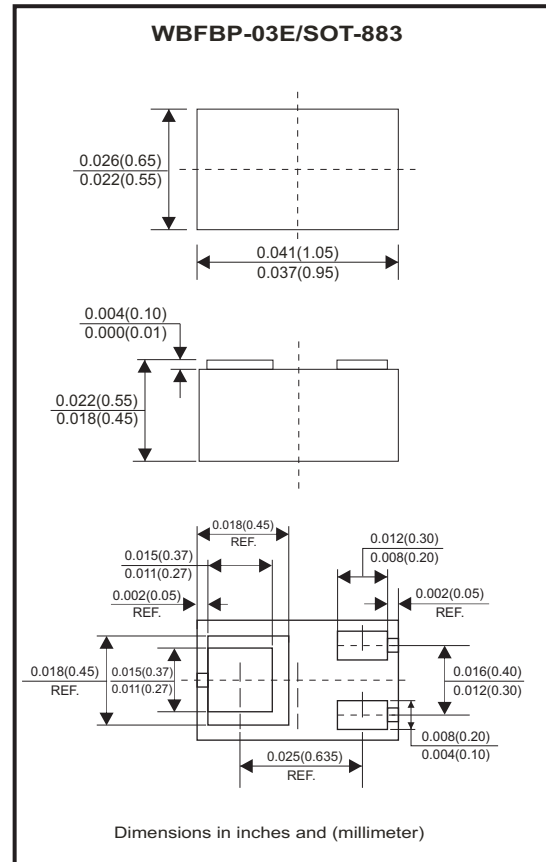
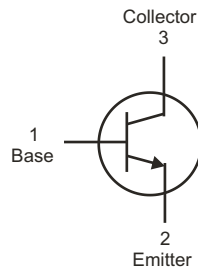
- Case: WBFBP-03E/SOT-883 molded plastic encapsulate diodes.
- Mounting position: Any.

### Marking: 1N



### Circuit Diagram

- 1. BASE
- 2. EMITTER
- 3. COLLECTOR



### Maximum Ratings (at TA=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Base voltage	$V_{CBO}$	60	V
Collector-Emitter voltage	$V_{CEO}$	40	V
Emitter-Base voltage	$V_{EBO}$	6	V
Collector current-continuous	$I_c$	200	mA
Collector dissipation	Note1	100	mW
	Note2	590	mW
Thermal resistance from junction to ambient	Note1	1250	°C/W
	Note2	212	°C/W
Junction temperature	$T_J$	150	°C
Storage temperature rage	$T_{stg}$	-55~150	°C

Note: 1. Device mounted on an FR4 PCB, single-side copper, tin-plated and standard footprint.

2. Device mounted on an FR4 PCB, single-side copper, tin-plated, mounting pad for collector 1cm<sup>2</sup>.

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## Electrical Characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Characteristics	Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector-Base breakdown voltage	$I_C = 10\mu\text{A}, I_E = 0$	$V_{(BR)CBO}$	60			V
Collector-Emitter breakdown voltage	$I_C = 1\text{mA}, I_B = 0$	$V_{(BR)CEO}$	40			V
Emitter-Base breakdown voltage	$I_E = 10\mu\text{A}, I_C = 0$	$V_{(BR)EBO}$	6			V
Collector cut-off current	$V_{CB} = 60\text{V}, I_E = 0$	$I_{CBO}$			0.1	$\mu\text{A}$
Collector cut-off current	$V_{CE} = 30\text{V}, V_{BE(off)} = 3\text{V}$	$I_{CEX}$			50	nA
Emitter cut-off current	$V_{EB} = 5\text{V}, I_C = 0$	$I_{EBO}$			0.1	$\mu\text{A}$
DC current gain	$V_{CE} = 1\text{V}, I_C = 10\text{mA}$	$h_{FE}$	100		300	
Collector-Emitter saturation voltage	$I_C = 50\text{mA}, I_B = 5\text{mA}$	$V_{CE(sat)}$			0.3	V
Base-Emitter saturation voltage	$I_C = 50\text{mA}, I_B = 5\text{mA}$	$V_{BE(sat)}$			0.95	V
Transition frequency	$V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$	$f_T$	300			MHZ
Delay Time	$V_{CC} = 3.0\text{V}, V_{BE(off)} = 0.5\text{V}$	$t_d$			35	nS
Rise Time	$I_C = 10\text{mA}, I_{B1} = 1\text{mA}$	$t_r$			35	nS
Storage Time	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}$	$t_s$			200	nS
Fall Time	$I_{B1} = I_{B2} = 1\text{mA}$	$t_f$			50	nS

## Rating And Characteristic Curves (TK3904LED03-HF)

Fig.1 - Static Characteristic

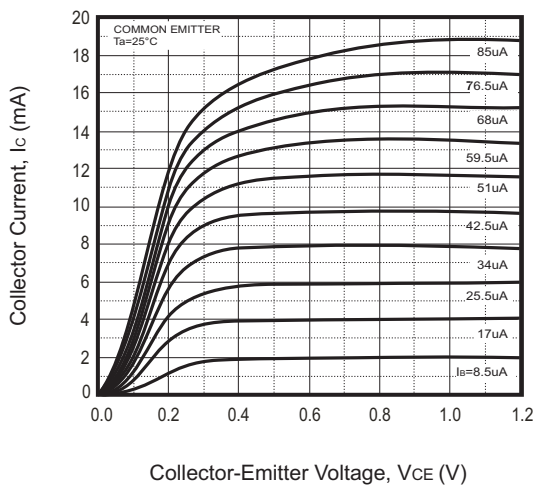
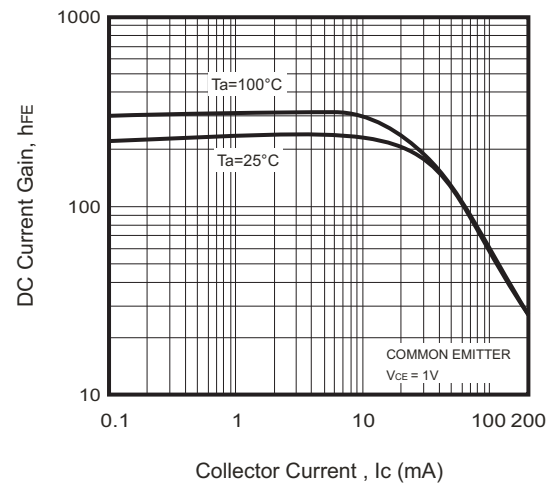


Fig.2 -  $h_{FE} - I_C$



## Rating And Characteristic Curves (TK3904LED03-HF)

Fig.3 -  $V_{BEsat} - I_c$

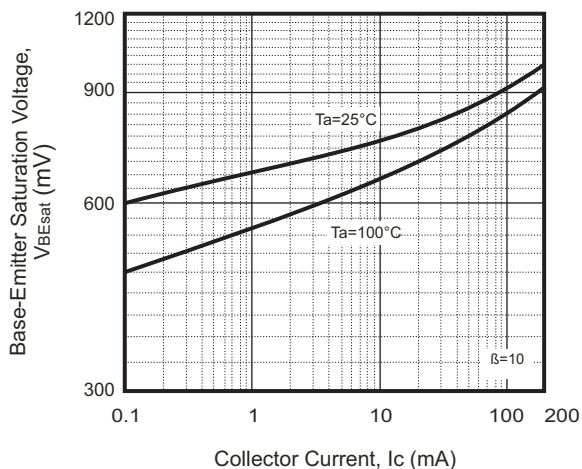


Fig.4 -  $V_{CEsat} - I_c$

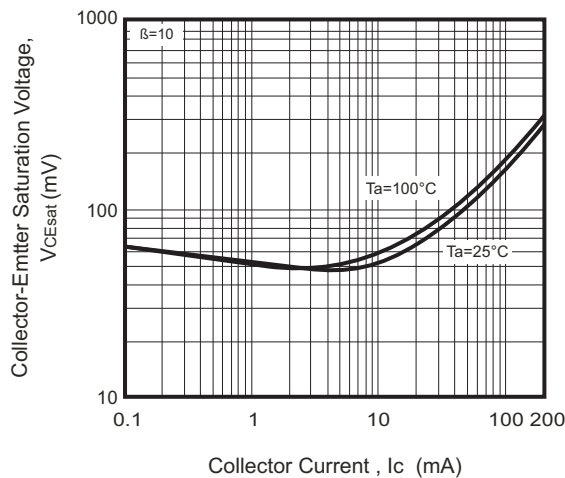


Fig.5 -  $I_c - V_{BE}$

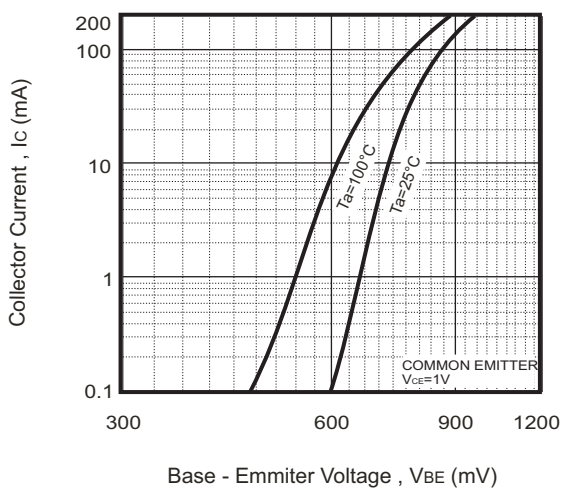


Fig.6 -  $f_T - I_c$

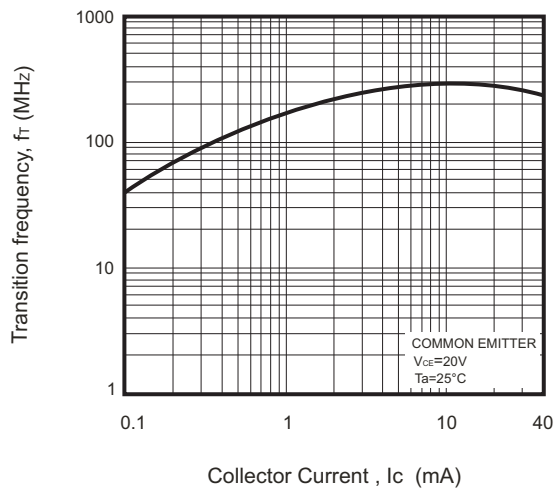


Fig.7 -  $C_{ob}/C_{ib} - V_{CB}/V_{EB}$

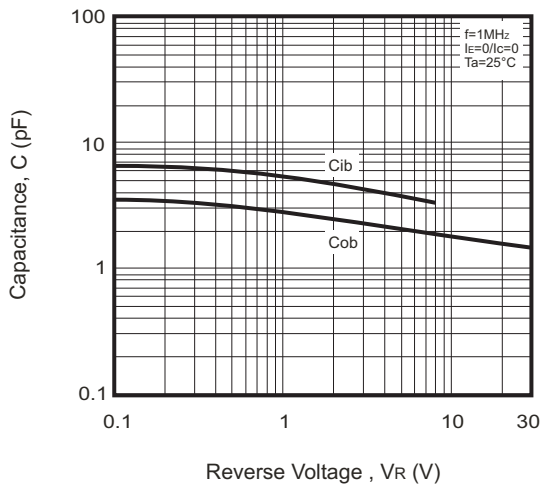
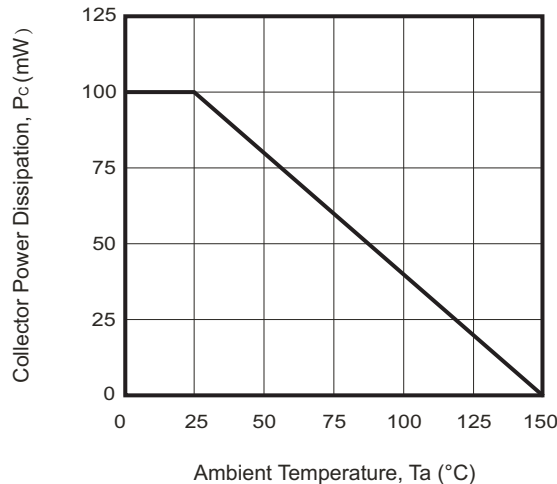
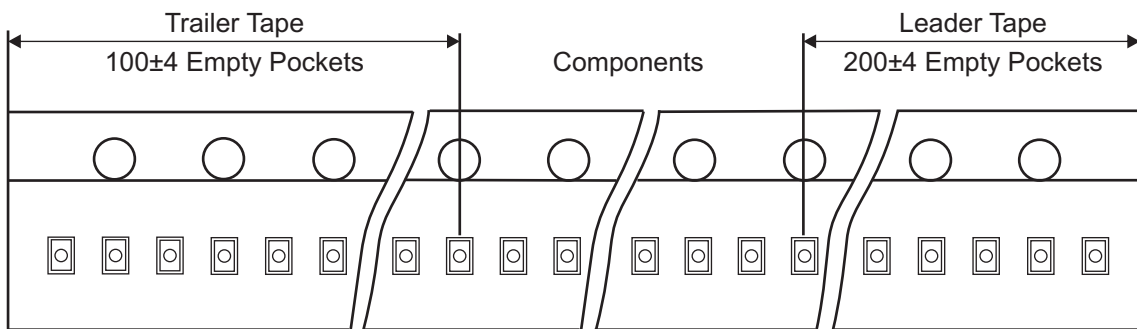
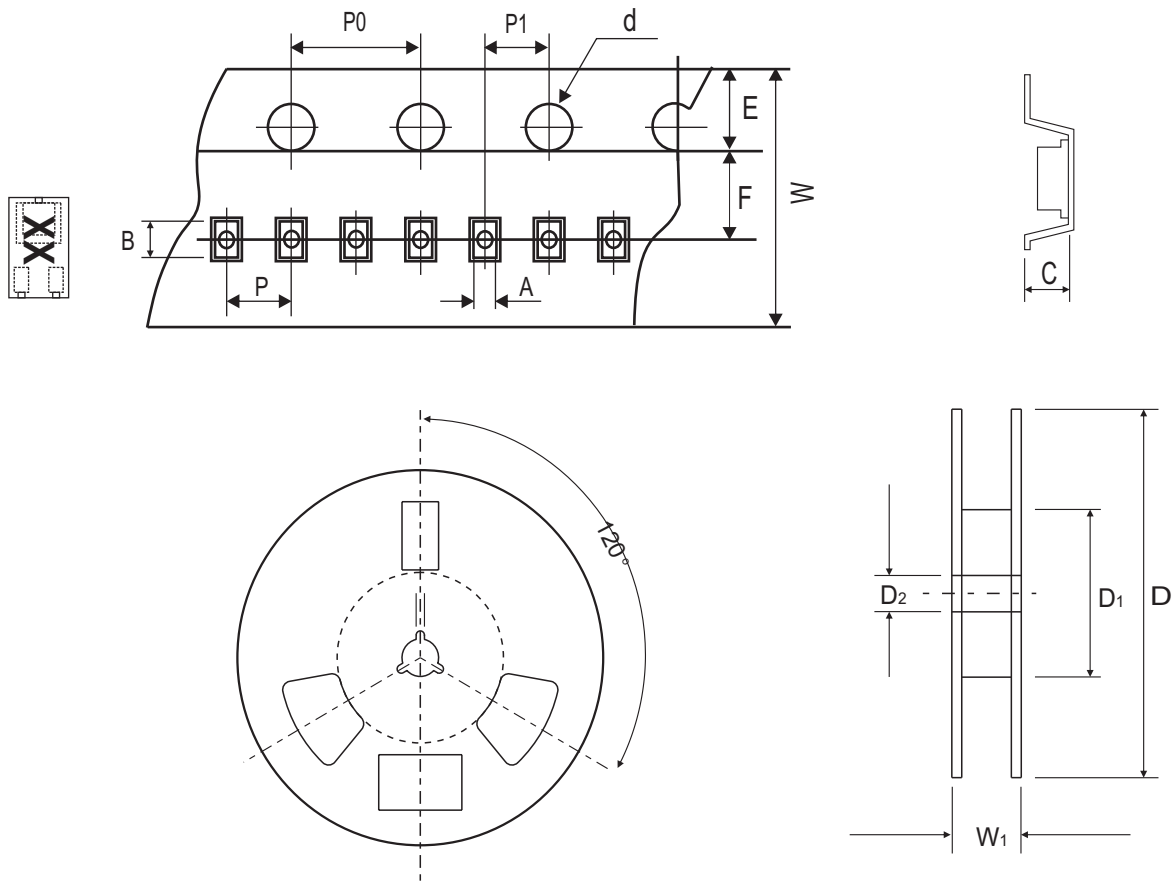


Fig.8 -  $P_c - T_a$



## Reel Taping Specification



WBFBP-03E (SOT-883)	SYMBOL	A	B	C	d	D	D <sub>1</sub>	D <sub>2</sub>
	(mm)	0.66 + 0.04 - 0.01	1.15 ± 0.05	0.66 ± 0.05	1.50 + 0.10	178.00 ± 2.00	54.40 ± 1.00	13.00 ± 1.00
	(inch)	0.026 + 0.002 - 0.0004	0.045 ± 0.002	0.026 ± 0.002	0.059 + 0.004	7.008 ± 0.079	2.142 ± 0.039	0.512 ± 0.039

WBFBP-03E (SOT-883)	SYMBOL	E	F	P	P <sub>0</sub>	P <sub>1</sub>	W	W <sub>1</sub>
	(mm)	1.75 ± 0.10	3.50 ± 0.05	2.00 ± 0.05	4.00 ± 0.05	2.00 ± 0.05	8.00 + 0.30 - 0.10	12.30 ± 1.00
	(inch)	0.069 ± 0.004	0.138 ± 0.002	0.079 ± 0.002	0.157 ± 0.002	0.079 ± 0.002	0.315 + 0.012 - 0.004	0.484 ± 0.039

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REV:A

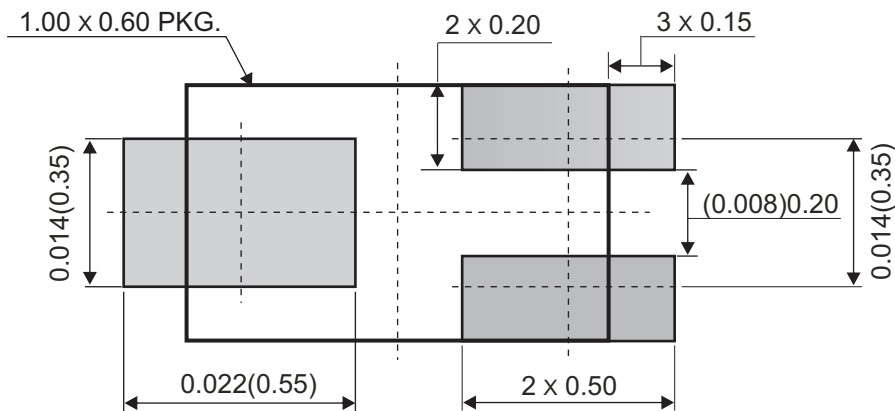
## Marking Code

Part Number	Marking Code
TK3904LED03-HF	1N



1N = Device code  
Solid dot = Pin 1 indicator

## Suggested PAD Layout



## Standard Packaging

Case Type	REEL PACK	
	REEL ( pcs )	Reel Size (inch)
WBFBP-03E	10,000	7