



## 13003DF

Preliminary

**NPN SILICON TRANSISTOR**

### NPN SILICON BIPOLAR TRANSISTORS FOR LOW FREQUENCY AMPLIFICATION

#### DESCRIPTION

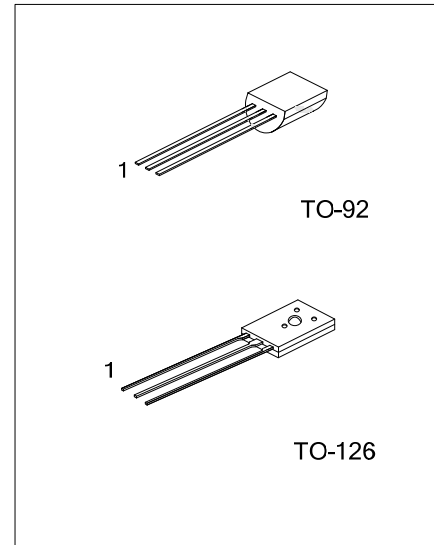
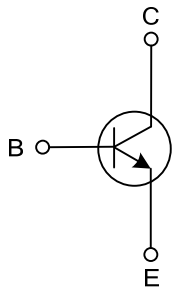
The UTC **13003DF** is a silicon NPN power switching transistor; it uses UTC's advanced technology to provide customers high collector-base breakdown voltage, low reverse leakage current and high reliability, etc.

The UTC **13003DF** is suitable for electronic ballast power switch circuit and the compact electronic energy-saving light.

#### FEATURES

- \* High collector-base breakdown voltage
- \* Low reverse leakage current
- \* High reliability

#### EQUIVALENT CIRCUIT



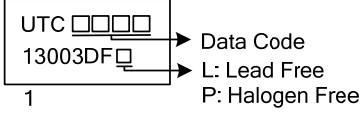
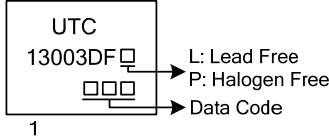
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
13003DFL-xx-T60-K	13003DFG-xx-T60-K	TO-126	B	C	E	Bulk
13003DFL-xx-T92-B	13003DFG-xx-T92-B	TO-92	E	C	B	Tape Box
13003DFL-xx-T92-K	13003DFG-xx-T92-K	TO-92	E	C	B	Bulk

Note: Pin Assignment: B: Base C: Collector E: Emitter

<p>13003DFL-xx-T60-K</p> <ul style="list-style-type: none"> <li>(1)Packing Type</li> <li>(2)Package Type</li> <li>(3)Rank</li> <li>(4)Lead Free</li> </ul>	<ul style="list-style-type: none"> <li>(1) B: Bluk, K: Bulk</li> <li>(2) T60: TO-126, T92: TO-92</li> <li>(3) xx: refer to Classification of <math>h_{FE}</math> vs. <math>t_s</math></li> <li>(4) L: Lead Free, G: Halogen Free</li> </ul>
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■ MARKING INFORMATION

PACKAGE	MARKING
TO-126	 <p>UTC □□□□ → Data Code            13003DF □ → L: Lead Free            1 → P: Halogen Free</p>
TO-92	 <p>UTC            13003DF □ → L: Lead Free            □□ → P: Halogen Free            1 → Data Code</p>

■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Base Voltage		$V_{CBO}$	600	V
Collector-Emitter Voltage		$V_{CEO}$	400	V
Emitter-Base Voltage		$V_{EBO}$	9	V
Continuous Collector Current		$I_C$	1.5	A
Power Dissipation	$T_A=25^\circ\text{C}$	$P_D$	1.25	W
	$T_C=25^\circ\text{C}$		50	W
Junction Temperature		$T_J$	150	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-55~+150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector-Base Breakdown Voltage	$BV_{CBO}$	$I_C=0.1\text{mA}$	600			V
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=1\text{mA}$	400			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=0.1\text{mA}$	9			V
Collector Cut-Off Current	$I_{CBO}$	$V_{CB}=600\text{V}, I_E=0$			0.1	mA
Collector-Emitter Cut-Off Current	$I_{CEO}$	$V_{CE}=400\text{V}, I_B=0$			0.1	mA
Emitter-Base Cut-Off Current	$I_{EBO}$	$V_{EB}=9\text{V}, I_C=0$			0.1	mA
DC Current Gain (Note 1)	$h_{FE}$	$V_{CE}=5\text{V}, I_C=0.2\text{A}$	15		30	
Low current and high current $h_{FE2}/h_{FE1}$ ratio	$h_{FE1}/h_{FE2}$	$h_{FE1}: V_{CE}=5\text{V}, I_C=5\text{mA}$	0.75	0.9		
		$h_{FE2}: V_{CE}=5\text{V}, I_C=0.2\text{A}$				
Collector-Emitter Saturation Voltage (Note)	$V_{CE(SAT)}$	$I_C=1\text{A}, I_B=0.25\text{A}$		0.3	0.9	V
Base-Emitter Saturation Voltage (Note)	$V_{BE(SAT)}$	$I_C=1\text{A}, I_B=0.25\text{A}$		0.9	1.2	V
Storage Time	$t_S$	UI9600, $I_C=0.1\text{A}$	3		5	$\mu\text{s}$
Rise Time	$t_R$				1	$\mu\text{s}$
Fall Time	$t_F$				1	$\mu\text{s}$
Transition Frequency	$f_T$	$I_C=0.1\text{A}, V_{CE}=10\text{V}, f=1\text{MHz}$	5			MHz

Note: Pulse test, pulse width  $t_p \leq 300\mu\text{s}$ , Duty cycles  $\leq 2\%$

■ CLASSIFICATION OF  $h_{FE}$

RANK	A	B	C
RANGE	15 ~ 20	20 ~ 25	25 ~ 30

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