

CMBT3904E NPN  
CMBT3906E PNP

**ENHANCED SPECIFICATION  
SURFACE MOUNT  
COMPLEMENTARY  
SILICON TRANSISTORS**



www.centrasemi.com

FEMTOmini™



SOT-923 CASE

**DESCRIPTION:**

The CENTRAL SEMICONDUCTOR CMBT3904E (NPN) and CMBT3906E (PNP) are general purpose transistors with enhanced specifications. These devices are ideal for applications where ultra small size and power dissipation are the prime requirements. Packaged in the FEMTOmini™ SOT-923 package, these transistors provide performance characteristics suitable for the most demanding size constrained applications.

**MARKING CODES: CMBT3904E: B  
CMBT3906E: G**

**FEATURES**

- Very Small Package Size
- 200mA Collector Current
- Low  $V_{CE(SAT)}$  (0.1V Typ @ 50mA)
- Miniature 0.8 x 0.6 x 0.4mm  
Ultra Low height profile  
FEMTOmini™ Surface Mount Package

**APPLICATIONS**

- DC / DC Converters
- Voltage Clamping
- Protection Circuits
- Battery powered applications including:  
Cell Phones, Digital Cameras, Pagers,  
PDAs, Laptop Computers, etc.

**MAXIMUM RATINGS:** ( $T_A=25^\circ\text{C}$ )

◆ <b>Collector-Base Voltage</b> Collector-Emitter Voltage	
◆ <b>Emitter-Base Voltage</b> Continuous Collector Current Power Dissipation Operating and Storage Junction Temperature Thermal Resistance	

SYMBOL		UNITS
<b><math>V_{CBO}</math></b>	<b>60</b>	<b>V</b>
$V_{CEO}$	40	V
<b><math>V_{EBO}</math></b>	<b>6.0</b>	<b>V</b>
$I_C$	200	mA
$P_D$	100	mW
$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$
$\theta_{JA}$	1250	$^\circ\text{C/W}$

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

SYMBOL	TEST CONDITIONS	MIN	NPN TYP	PNP TYP	MAX	UNITS
$I_{CEV}$	$V_{CE}=30\text{V}, V_{EB}=3.0\text{V}$				50	nA
◆ <b><math>BV_{CBO}</math></b>	<b><math>I_C=10\mu\text{A}</math></b>	<b>60</b>	<b>115</b>	<b>90</b>		<b>V</b>
$BV_{CEO}$	$I_C=1.0\text{mA}$	40	60	55		V
◆ <b><math>BV_{EBO}</math></b>	<b><math>I_E=10\mu\text{A}</math></b>	<b>6.0</b>	<b>7.5</b>	<b>7.9</b>		<b>V</b>
◆ <b><math>V_{CE(SAT)}</math></b>	<b><math>I_C=10\text{mA}, I_B=1.0\text{mA}</math></b>		<b>0.057</b>	<b>0.050</b>	<b>0.100</b>	<b>V</b>
◆ <b><math>V_{CE(SAT)}</math></b>	<b><math>I_C=50\text{mA}, I_B=5.0\text{mA}</math></b>		<b>0.100</b>	<b>0.100</b>	<b>0.200</b>	<b>V</b>
$V_{BE(SAT)}$	$I_C=10\text{mA}, I_B=1.0\text{mA}$	0.650	0.750	0.750	0.850	V
$V_{BE(SAT)}$	$I_C=50\text{mA}, I_B=5.0\text{mA}$		0.850	0.850	0.950	V

◆ Enhanced specification.

R1 (8-January 2010)

CMBT3904E NPN  
CMBT3906E PNP



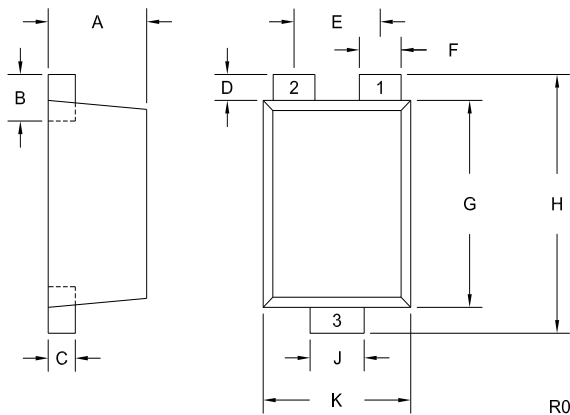
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**ELECTRICAL CHARACTERISTICS - Continued:**

SYMBOL	TEST CONDITIONS	MIN	TYP	NPN TYP	PNP MAX	UNITS
◆ h <sub>FE</sub>	V <sub>CE</sub> =1.0V, I <sub>C</sub> =0.1mA	90	240	130		
◆ h <sub>FE</sub>	V <sub>CE</sub> =1.0V, I <sub>C</sub> =1.0mA	100	235	150		
h <sub>FE</sub>	V <sub>CE</sub> =1.0V, I <sub>C</sub> =10mA	100	215	150	300	
◆ h <sub>FE</sub>	V <sub>CE</sub> =1.0V, I <sub>C</sub> =50mA	70	110	120		
h <sub>FE</sub>	V <sub>CE</sub> =1.0V, I <sub>C</sub> =100mA	30	50	55		
f <sub>T</sub>	V <sub>CE</sub> =20V, I <sub>C</sub> =10mA, f=100MHz	300				MHz
C <sub>ob</sub>	V <sub>CB</sub> =5.0V, I <sub>E</sub> =0, f=1.0MHz				4.0	pF
C <sub>ib</sub>	V <sub>BE</sub> =0.5V, I <sub>C</sub> =0, f=1.0MHz				8.0	pF
h <sub>ie</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =1.0mA, f=1.0kHz	1.0			12	kΩ
h <sub>re</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =1.0mA, f=1.0kHz	0.1			10	X10 <sup>-4</sup>
h <sub>fe</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =1.0mA, f=1.0kHz	100			400	
h <sub>oe</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =1.0mA, f=1.0kHz	1.0			60	μS
NF	V <sub>CE</sub> =5.0V, I <sub>C</sub> =100μA, R <sub>S</sub> =1.0kΩ, f=10Hz to 15.7kHz				4.0	dB
t <sub>d</sub>	V <sub>CC</sub> =3.0V, V <sub>BE</sub> =0.5V, I <sub>C</sub> =10mA, I <sub>B1</sub> =1.0mA				35	ns
t <sub>r</sub>	V <sub>CC</sub> =3.0V, V <sub>BE</sub> =0.5V, I <sub>C</sub> =10mA, I <sub>B1</sub> =1.0mA				35	ns
t <sub>s</sub>	V <sub>CC</sub> =3.0V, I <sub>C</sub> =10mA, I <sub>B1</sub> =I <sub>B2</sub> =1.0mA				200	ns
t <sub>f</sub>	V <sub>CC</sub> =3.0V, I <sub>C</sub> =10mA, I <sub>B1</sub> =I <sub>B2</sub> =1.0mA				50	ns

◆ Enhanced specification.

**SOT-923 CASE - MECHANICAL OUTLINE**



SYMBOL	DIMENSIONS			
	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.015	0.016	0.39	0.41
B	0.004	0.010	0.10	0.26
C	0.003	0.006	0.08	0.14
D	0.002	0.006	0.05	0.15
E	0.014		0.35	
F	0.005	0.009	0.12	0.22
G	0.030	0.033	0.75	0.85
H	0.035	0.043	0.90	1.10
J	0.007	0.011	0.17	0.27
K	0.022	0.026	0.55	0.65

SOT-923 (REV: R0)

**LEAD CODE:**

- 1) BASE
- 2) EMITTER
- 3) COLLECTOR

**MARKING CODES:**

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