



CMBT3904E NPN
CMBT3906E PNP

**ENHANCED SPECIFICATION
COMPLEMENTARY FEMTOmini™
SILICON TRANSISTORS**



FEMTOmini™



SOT-923 CASE

Central™ Semiconductor Corp.

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

- ◆ **Collector-Base Voltage**
Collector-Emitter Voltage
- ◆ **Emitter-Base Voltage**
Collector Current
Power Dissipation
Operating and Storage
Junction Temperature
Thermal Resistance

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

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

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

R0 (17-April 2007)

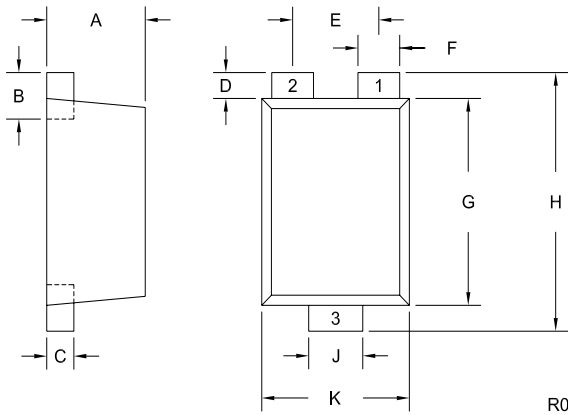
ENHANCED SPECIFICATION
COMPLEMENTARY FEMTOminiTM
SILICON TRANSISTORS

ELECTRICAL CHARACTERISTICS (continued)

| SYMBOL | TEST CONDITIONS | MIN | NPN | | MAX | UNITS |
|-------------------|--|-----|-----|-----|-----|-------------------|
| | | | TYP | TYP | | |
| ◆ h _{FE} | V _{CE} =1.0V, I _C =0.1mA | 90 | 240 | 130 | | |
| ◆ h _{FE} | V _{CE} =1.0V, I _C =1.0mA | 100 | 235 | 150 | | |
| h _{FE} | V _{CE} =1.0V, I _C =10mA | 100 | 215 | 150 | 300 | |
| ◆ h _{FE} | V _{CE} =1.0V, I _C =50mA | 70 | 110 | 120 | | |
| h _{FE} | V _{CE} =1.0V, I _C =100mA | 30 | 50 | 55 | | |
| f _T | V _{CE} =20V, I _C =10mA, f=100MHz | 300 | | | | MHz |
| C _{ob} | V _{CB} =5.0V, I _E =0, f=1.0MHz | | | | 4.0 | pF |
| C _{ib} | V _{BE} =0.5V, I _C =0, f=1.0MHz | | | | 8.0 | pF |
| h _{ie} | V _{CE} =10V, I _C =1.0mA, f=1.0kHz | 1.0 | | | 12 | kΩ |
| h _{re} | V _{CE} =10V, I _C =1.0mA, f=1.0kHz | 0.1 | | | 10 | X10 ⁻⁴ |
| h _{fe} | V _{CE} =10V, I _C =1.0mA, f=1.0kHz | 100 | | | 400 | |
| h _{oe} | V _{CE} =10V, I _C =1.0mA, f=1.0kHz | 1.0 | | | 60 | μmhos |
| NF | V _{CE} =5.0V, I _C =100μA, R _S =1.0kΩ, f=10Hz to 15.7kHz | | | | 4.0 | dB |
| t _d | V _{CC} =3.0V, V _{BE} =0.5V, I _C =10mA, I _{B1} =1.0mA | | | | 35 | ns |
| t _r | V _{CC} =3.0V, V _{BE} =0.5V, I _C =10mA, I _{B1} =1.0mA | | | | 35 | ns |
| t _s | V _{CC} =3.0V, I _C =10mA, I _{B1} =I _{B2} =1.0mA | | | | 200 | ns |
| t _f | V _{CC} =3.0V, I _C =10mA, I _{B1} =I _{B2} =1.0mA | | | | 50 | ns |

◆ Enhanced specification.

SOT-923 - 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

R0 (17-April 2007)