

DATA SHEET



NEC's NPN SILICON TRANSISTOR

NE851M33

FEATURES

- LOW PHASE DISTORTION, LOW VOLTAGE OPERATION
- IDEAL FOR OSC APPLICATIONS
- 3-PIN SUPER LEAD-LESS MINIMOLD (M33) PACKAGE

ORDERING INFORMATION

| PART NUMBER | QUANTITY | SUPPLYING FORM |
|---------------|-------------------|---|
| NE851M33-A | 50 pcs (Non reel) | • 8 mm wide embossed taping • Pin 2 (Base) face the perforation side of the tape |
| NE851M33-T3-A | 10 kpcs/reel | |

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (TA = +25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|------------------------------|----------------------------------|-------------|------|
| Collector to Base Voltage | V _{CBO} | 9.0 | V |
| Collector to Emitter Voltage | V _{CEO} | 5.5 | V |
| Emitter to Base Voltage | V _{EBO} | 1.5 | V |
| Collector Current | I _c | 100 | mA |
| Total Power Dissipation | P _{tot} ^{Note} | 130 | mW |
| Junction Temperature | T _j | 150 | °C |
| Storage Temperature | T _{stg} | -65 to +150 | °C |

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|------------------------------|----------------------------|---|------|------|------|------|
| DC Characteristics | | | | | | |
| Collector Cut-off Current | I_{CBO} | $V_{CB} = 5\text{ V}, I_E = 0\text{ mA}$ | – | – | 600 | nA |
| Emitter Cut-off Current | I_{EBO} | $V_{EB} = 1\text{ V}, I_C = 0\text{ mA}$ | – | – | 600 | nA |
| DC Current Gain | h_{FE} ^{Note 1} | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$ | 100 | 120 | 145 | – |
| RF Characteristics | | | | | | |
| Gain Bandwidth Product (1) | f_T | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$ | 3.0 | 4.5 | – | GHz |
| Gain Bandwidth Product (2) | f_T | $V_{CE} = 1\text{ V}, I_C = 15\text{ mA}, f = 2\text{ GHz}$ | 5.0 | 6.5 | – | GHz |
| Insertion Power Gain (1) | $ S_{21e} ^2$ | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$ | 3.0 | 4.0 | – | dB |
| Insertion Power Gain (2) | $ S_{21e} ^2$ | $V_{CE} = 1\text{ V}, I_C = 15\text{ mA}, f = 2\text{ GHz}$ | 4.5 | 5.5 | – | dB |
| Noise Figure | NF | $V_{CE} = 1\text{ V}, I_C = 10\text{ mA}, f = 2\text{ GHz},$ $Z_S = Z_{opt}$ | – | 1.9 | 2.5 | dB |
| Reverse Transfer Capacitance | C_{re} ^{Note 2} | $V_{CB} = 0.5\text{ V}, I_C = 0\text{ mA}, f = 1\text{ MHz}$ | – | 0.6 | 0.8 | pF |

Notes 1. Pulse measurement: $PW \leq 350\ \mu\text{s}$, Duty Cycle $\leq 2\%$

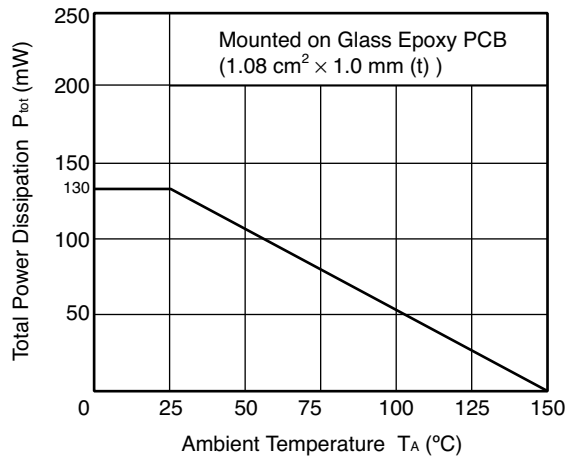
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

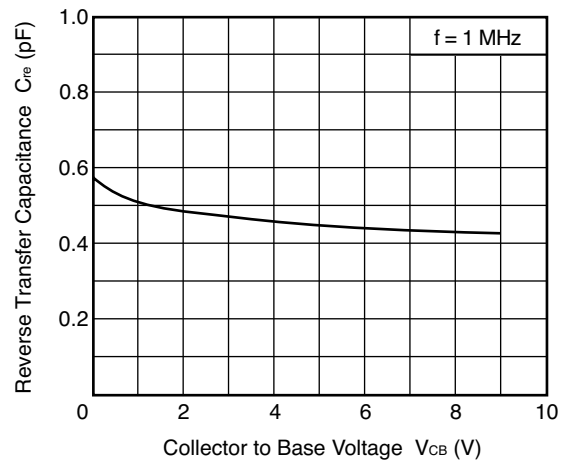
| RANK | FB |
|----------------|------------|
| Marking | E7 |
| h_{FE} Value | 100 to 145 |

TYPICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise specified)

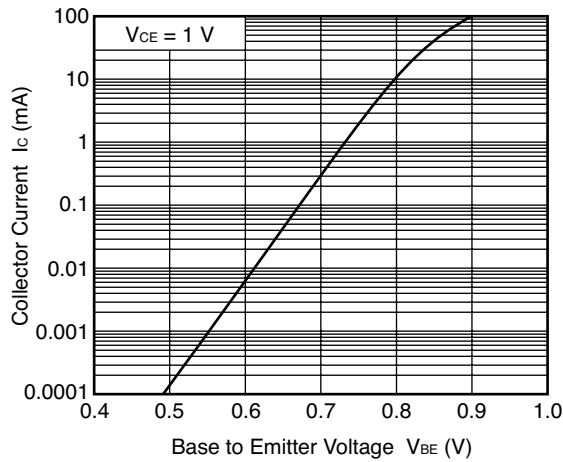
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



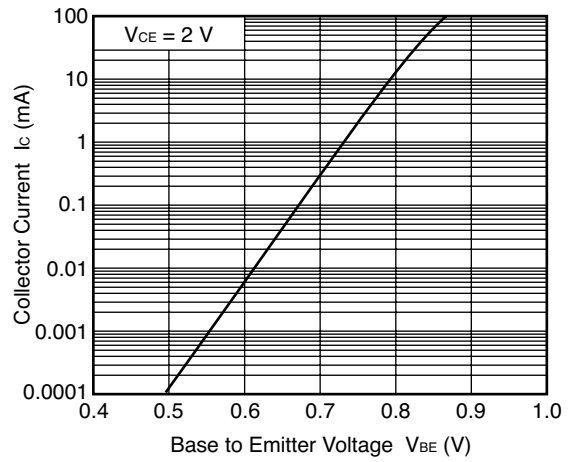
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



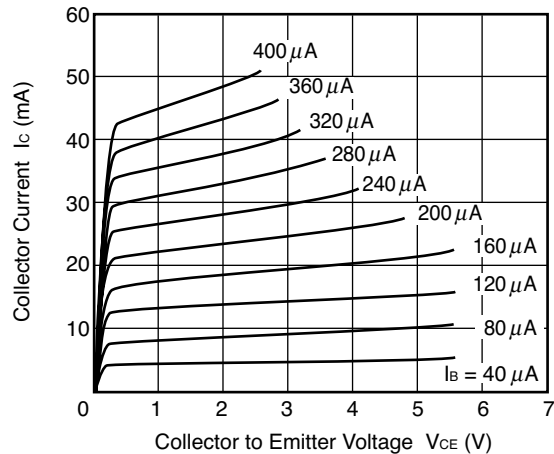
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

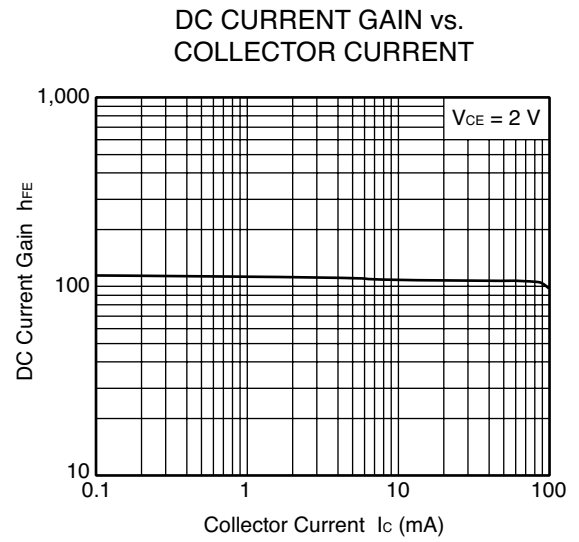
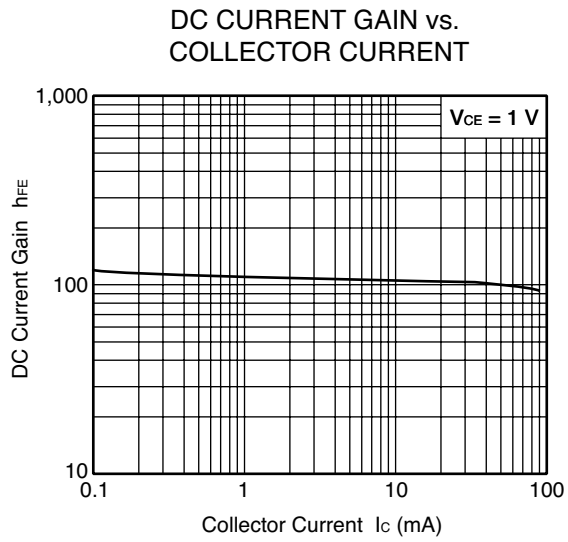


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



Remark The graphs indicate nominal characteristics.

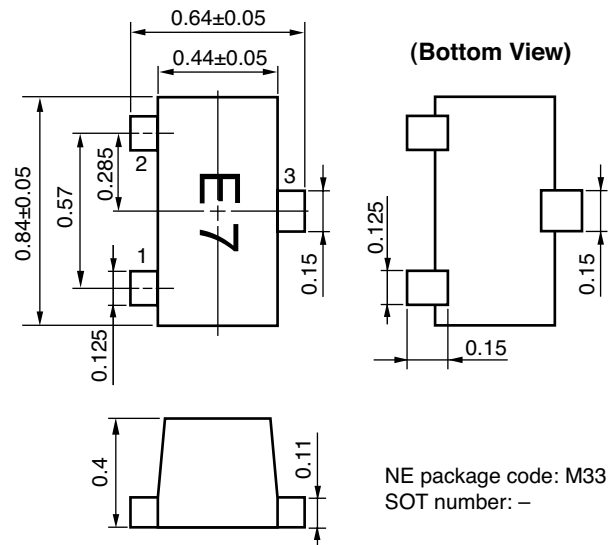
TYPICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise specified)



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

3-PIN SUPER LEAD-LESS MINIMOLD (M33) (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

CEL California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.
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DATA SUBJECT TO CHANGE WITHOUT NOTICE

06/07/2004

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices | |
|-------------------------------|---|--|-----|
| | | -A | -AZ |
| Lead (Pb) | < 1000 PPM | Not Detected | (*) |
| Mercury | < 1000 PPM | Not Detected | |
| Cadmium | < 100 PPM | Not Detected | |
| Hexavalent Chromium | < 1000 PPM | Not Detected | |
| PBB | < 1000 PPM | Not Detected | |
| PBDE | < 1000 PPM | Not Detected | |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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In no event shall CEL’s liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.