

# NX1117C; NX1117CE series

## Low-dropout linear regulators

Rev. 2 — 11 December 2012

Product data sheet

## 1. General description

The NX1117C/NX1117CE are two series of low-dropout positive voltage regulators with an output current capability of 1 A. The two series consist of 18 fixed output voltage versions and two adjustable output voltage versions. NX1117C series offers an output voltage accuracy of  $\pm 1\%$  and NX1117CE series of  $\pm 1.25\%$ .

The regulators feature output current limiting, Safe Operating Area (SOA) control, and thermal shutdown.

The NX1117C/NX1117CE series are housed in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

**Table 1. Product overview**

| Output voltage $V_{out}$ (V) | Output voltage accuracy of $\pm 1\%$ | Output voltage accuracy of $\pm 1.25\%$ |
|------------------------------|--------------------------------------|-----------------------------------------|
| 1.25 adjustable              | NX1117CADJZ                          | NX1117CEADJZ                            |
| 1.2                          | NX1117C12Z                           | NX1117CE12Z                             |
| 1.5                          | NX1117C15Z                           | NX1117CE15Z                             |
| 1.8                          | NX1117C18Z                           | NX1117CE18Z                             |
| 1.9                          | NX1117C19Z                           | NX1117CE19Z                             |
| 2.0                          | NX1117C20Z                           | NX1117CE20Z                             |
| 2.5                          | NX1117C25Z                           | NX1117CE25Z                             |
| 2.85                         | NX1117C285Z                          | NX1117CE285Z                            |
| 3.3                          | NX1117C33Z                           | NX1117CE33Z                             |
| 5.0                          | NX1117C50Z                           | NX1117CE50Z                             |

## 2. Features and benefits

- Maximum output current of 1 A
- Wide operation range to 20 V input
- Output voltage accuracy of  $\pm 1\%$  or  $\pm 1.25\%$
- Output current limiting
- SOA control
- Thermal shutdown
- No minimum load requirements for fixed output voltage versions
- Temperature range  $-40\text{ }^{\circ}\text{C}$  to  $125\text{ }^{\circ}\text{C}$



### 3. Applications

- Post regulator for switching DC-to-DC converter
- High-efficiency linear regulators
- Battery charger
- USB devices
- Hard drive controllers
- Consumer and industrial equipment point of load

### 4. Ordering information

Table 2. Ordering information

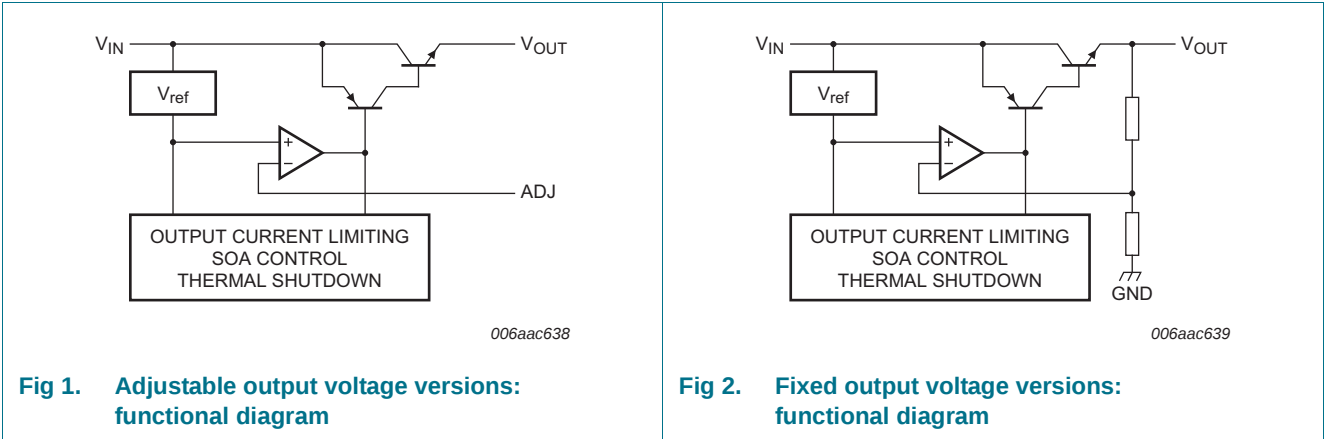
| Type number             | Package |                                                                   |         |
|-------------------------|---------|-------------------------------------------------------------------|---------|
|                         | Name    | Description                                                       | Version |
| NX1117C/NX1117CE series | -       | plastic surface-mounted package with increased heat sink; 4 leads | SOT223  |

### 5. Marking

Table 3. Marking codes

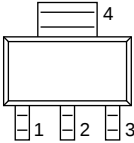
| Type number | Marking code | Type number  | Marking code |
|-------------|--------------|--------------|--------------|
| NX1117CADJZ | NCADJZ       | NX1117CEADJZ | 7CEADJ       |
| NX1117C12Z  | N7C12Z       | NX1117CE12Z  | 7CE12Z       |
| NX1117C15Z  | N7C15Z       | NX1117CE15Z  | 7CE15Z       |
| NX1117C18Z  | N7C18Z       | NX1117CE18Z  | 7CE18Z       |
| NX1117C19Z  | N7C19Z       | NX1117CE19Z  | 7CE19Z       |
| NX1117C20Z  | N7C20Z       | NX1117CE20Z  | 7CE20Z       |
| NX1117C25Z  | N7C25Z       | NX1117CE25Z  | 7CE25Z       |
| NX1117C285Z | NC285Z       | NX1117CE285Z | 7CE285       |
| NX1117C33Z  | N7C33Z       | NX1117CE33Z  | 7CE33Z       |
| NX1117C50Z  | N7C50Z       | NX1117CE50Z  | 7CE50Z       |

6. Functional diagram



7. Pinning information

Table 4. Pinning

| Pin | Symbol           | Description      | Simplified outline                                                                    |
|-----|------------------|------------------|---------------------------------------------------------------------------------------|
| 1   | ADJ or GND       | adjust or ground |  |
| 2   | V <sub>OUT</sub> | output           |                                                                                       |
| 3   | V <sub>IN</sub>  | input            |                                                                                       |
| 4   | V <sub>OUT</sub> | output           |                                                                                       |

[1] ADJ for NX1117CADJZ and NX1117CEADJZ; GND for all other devices.

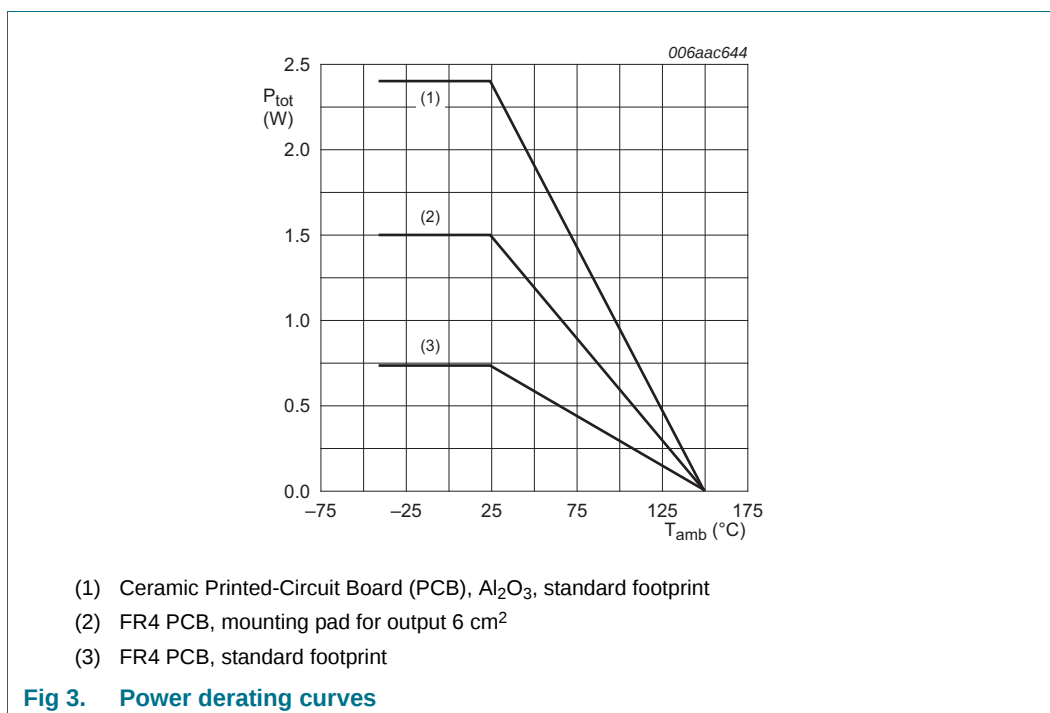
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol           | Parameter                       | Conditions                     | Min                | Max  | Unit |
|------------------|---------------------------------|--------------------------------|--------------------|------|------|
| V <sub>in</sub>  | input voltage                   |                                | -                  | 20   | V    |
| V <sub>ESD</sub> | electrostatic discharge voltage | MIL-STD-883 (human body model) | 2                  | -    | kV   |
|                  |                                 | machine model                  | 400                | -    | V    |
| P <sub>tot</sub> | total power dissipation         | [1]                            | internally limited |      |      |
| T <sub>j</sub>   | junction temperature            |                                | -                  | 150  | °C   |
| T <sub>amb</sub> | ambient temperature             |                                | -40                | +125 | °C   |
| T <sub>stg</sub> | storage temperature             |                                | -65                | +150 | °C   |

[1] The maximum package power dissipation is  $P_{tot} = \frac{T_j - T_{amb}}{R_{th(j-a)}}$ .



## 9. Recommended operating conditions

**Table 6. Recommended operation conditions**

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| Symbol   | Parameter     | Conditions | Min | Max | Unit |
|----------|---------------|------------|-----|-----|------|
| $V_{in}$ | input voltage |            | -   | 20  | V    |

## 10. Thermal characteristics

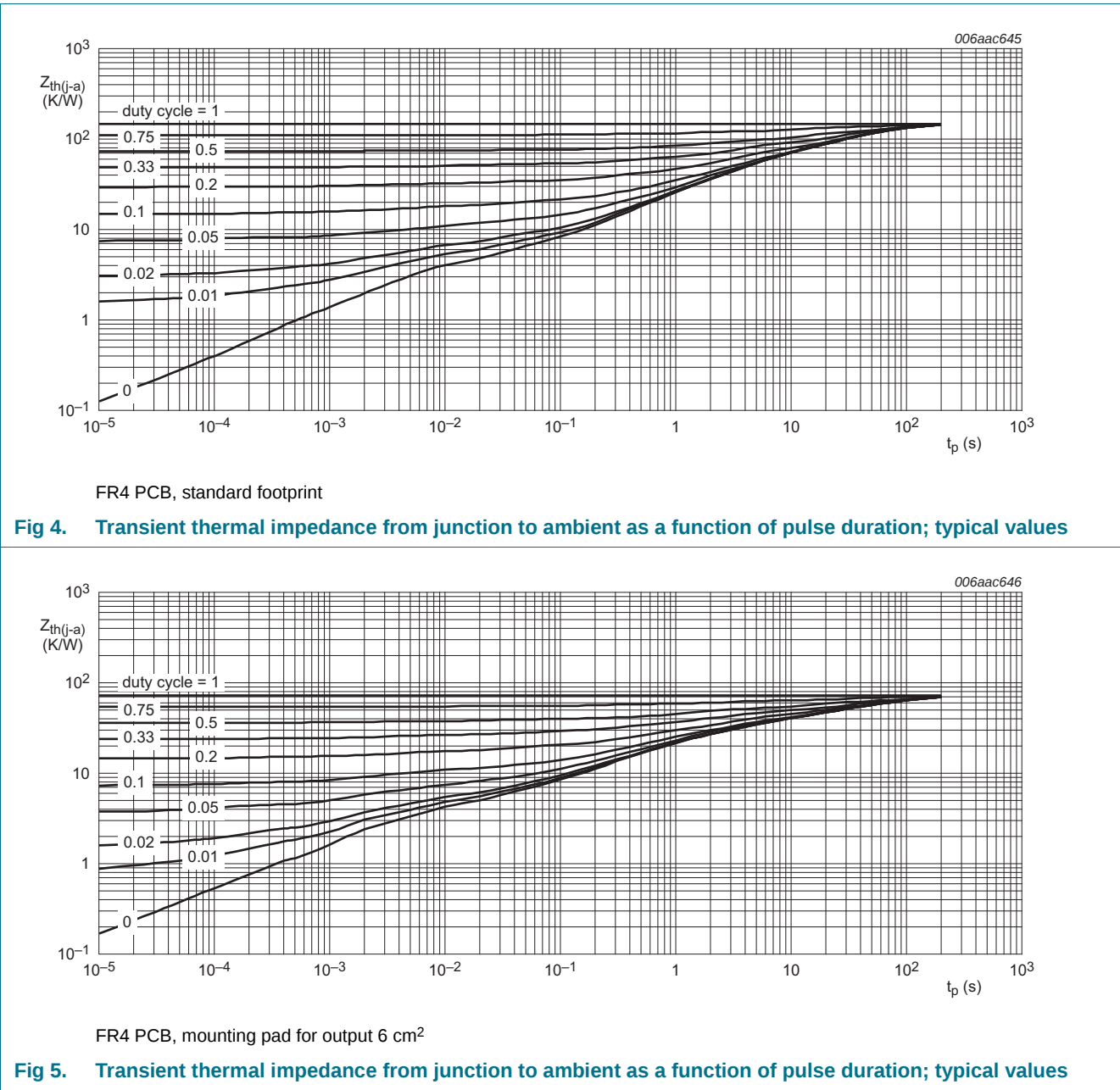
**Table 7. Thermal characteristics**

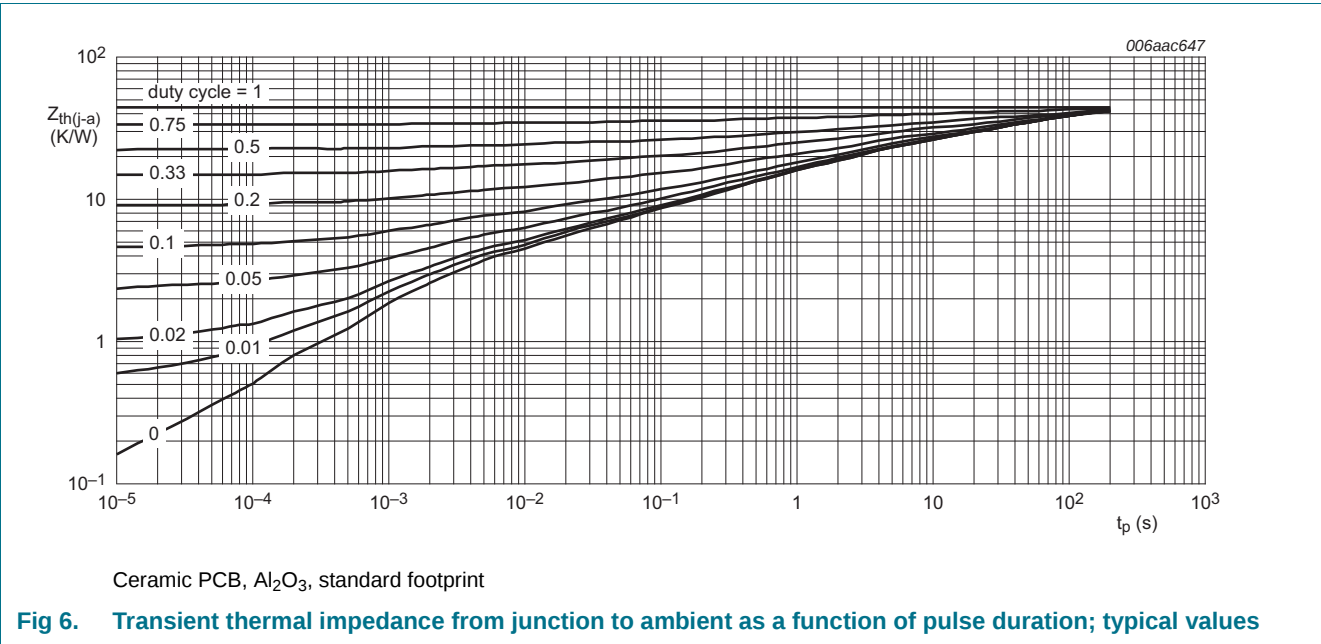
| Symbol         | Parameter                                        | Conditions  | Min   | Typ | Max | Unit               |
|----------------|--------------------------------------------------|-------------|-------|-----|-----|--------------------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air | [1] - | -   | 150 | K/W                |
|                |                                                  |             | [2] - | -   | 72  | K/W                |
|                |                                                  |             | [3] - | -   | 45  | K/W                |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | -     | -   | 20  | K/W                |
| $T_{sd}$       | shutdown temperature                             |             | -     | 135 | -   | $^{\circ}\text{C}$ |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for output 6 cm<sup>2</sup>.

[3] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.





## 11. Characteristics

| Table 8. Characteristics                                                                                                                                                                                                                                                                            |                   |                                                                                                                            |       |       |       |      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|------|
| <i>C<sub>in</sub></i> = 680 nF in series with 1 Ω, and <i>C<sub>out</sub></i> = 680 nF in series with 1 Ω. For typical value <i>T<sub>amb</sub></i> = 25 °C; for minimum and maximum values <i>T<sub>amb</sub></i> is the operating temperature range −40 °C to 125 °C; unless otherwise specified. |                   |                                                                                                                            |       |       |       |      |
| Symbol                                                                                                                                                                                                                                                                                              | Parameter         | Conditions                                                                                                                 | Min   | Typ   | Max   | Unit |
| <i>V<sub>ref</sub></i>                                                                                                                                                                                                                                                                              | reference voltage |                                                                                                                            |       |       |       |      |
|                                                                                                                                                                                                                                                                                                     | NX1117CADJZ       | <i>I<sub>out</sub></i> = 10 mA; <i>V<sub>in</sub></i> − <i>V<sub>ref</sub></i> = 2 V; <i>T<sub>amb</sub></i> = 25 °C       | 1.238 | 1.250 | 1.262 | V    |
|                                                                                                                                                                                                                                                                                                     |                   | 10 mA ≤ <i>I<sub>out</sub></i> ≤ 800 mA; 1.5 V ≤ <i>V<sub>in</sub></i> − <i>V<sub>ref</sub></i> ≤ 15 V <a href="#">[1]</a> | 1.225 | -     | 1.275 | V    |
|                                                                                                                                                                                                                                                                                                     | NX1117CEADJZ      | <i>I<sub>out</sub></i> = 10 mA; <i>V<sub>in</sub></i> − <i>V<sub>ref</sub></i> = 2 V; <i>T<sub>amb</sub></i> = 25 °C       | 1.234 | 1.250 | 1.266 | V    |
|                                                                                                                                                                                                                                                                                                     |                   | 10 mA ≤ <i>I<sub>out</sub></i> ≤ 800 mA; 1.5 V ≤ <i>V<sub>in</sub></i> − <i>V<sub>ref</sub></i> ≤ 15 V <a href="#">[1]</a> | 1.219 | -     | 1.281 | V    |

**Table 8. Characteristics ...continued**

$C_{in} = 680 \text{ nF}$  in series with  $1 \Omega$ , and  $C_{out} = 680 \text{ nF}$  in series with  $1 \Omega$ . For typical value  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ ; for minimum and maximum values  $T_{amb}$  is the operating temperature range  $-40 \text{ }^{\circ}\text{C}$  to  $125 \text{ }^{\circ}\text{C}$ ; unless otherwise specified.

| Symbol    | Parameter      | Conditions                                                                                        | Min                       | Typ   | Max   | Unit |
|-----------|----------------|---------------------------------------------------------------------------------------------------|---------------------------|-------|-------|------|
| $V_{out}$ | output voltage |                                                                                                   |                           |       |       |      |
|           | NX1117C12Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.2 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.188                     | 1.200 | 1.212 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $2.6 \text{ V} \leq V_{in} \leq 11.2 \text{ V}$ | <a href="#">[1]</a> 1.176 | -     | 1.224 | V    |
|           | NX1117CE12Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.2 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.185                     | 1.200 | 1.215 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $2.6 \text{ V} \leq V_{in} \leq 11.2 \text{ V}$ | <a href="#">[1]</a> 1.170 | -     | 1.230 | V    |
|           | NX1117C15Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.5 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.485                     | 1.500 | 1.515 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $2.9 \text{ V} \leq V_{in} \leq 11.5 \text{ V}$ | <a href="#">[1]</a> 1.470 | -     | 1.530 | V    |
|           | NX1117CE15Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.5 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.481                     | 1.500 | 1.519 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $2.9 \text{ V} \leq V_{in} \leq 11.5 \text{ V}$ | <a href="#">[1]</a> 1.462 | -     | 1.538 | V    |
|           | NX1117C18Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.8 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.782                     | 1.800 | 1.818 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.2 \text{ V} \leq V_{in} \leq 11.8 \text{ V}$ | <a href="#">[1]</a> 1.764 | -     | 1.836 | V    |
|           | NX1117CE18Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.8 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.777                     | 1.800 | 1.823 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.2 \text{ V} \leq V_{in} \leq 11.8 \text{ V}$ | <a href="#">[1]</a> 1.755 | -     | 1.845 | V    |
|           | NX1117C19Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.9 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.881                     | 1.900 | 1.919 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.3 \text{ V} \leq V_{in} \leq 11.9 \text{ V}$ | <a href="#">[1]</a> 1.862 | -     | 1.938 | V    |
|           | NX1117CE19Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 3.9 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.876                     | 1.900 | 1.924 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.3 \text{ V} \leq V_{in} \leq 11.9 \text{ V}$ | <a href="#">[1]</a> 1.852 | -     | 1.948 | V    |
|           | NX1117C20Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 4.0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.980                     | 2.000 | 2.020 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.4 \text{ V} \leq V_{in} \leq 12 \text{ V}$   | <a href="#">[1]</a> 1.960 | -     | 2.040 | V    |
|           | NX1117CE20Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 4.0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 1.975                     | 2.000 | 2.025 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.4 \text{ V} \leq V_{in} \leq 12 \text{ V}$   | <a href="#">[1]</a> 1.950 | -     | 2.050 | V    |
|           | NX1117C25Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 4.5 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 2.475                     | 2.500 | 2.525 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.9 \text{ V} \leq V_{in} \leq 12 \text{ V}$   | <a href="#">[1]</a> 2.450 | -     | 2.550 | V    |
|           | NX1117CE25Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 4.5 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 2.469                     | 2.500 | 2.531 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $3.9 \text{ V} \leq V_{in} \leq 12 \text{ V}$   | <a href="#">[1]</a> 2.437 | -     | 2.563 | V    |
|           | NX1117C285Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 4.85 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$   | 2.820                     | 2.850 | 2.880 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $4.25 \text{ V} \leq V_{in} \leq 10 \text{ V}$  | <a href="#">[1]</a> 2.790 | -     | 2.910 | V    |
|           | NX1117CE285Z   | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 4.85 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$   | 2.814                     | 2.850 | 2.886 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $4.25 \text{ V} \leq V_{in} \leq 10 \text{ V}$  | <a href="#">[1]</a> 2.779 | -     | 2.921 | V    |
|           | NX1117C33Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 5.3 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 3.267                     | 3.300 | 3.333 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $4.75 \text{ V} \leq V_{in} \leq 10 \text{ V}$  | <a href="#">[1]</a> 3.235 | -     | 3.365 | V    |
|           | NX1117CE33Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 5.3 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 3.259                     | 3.300 | 3.341 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $4.75 \text{ V} \leq V_{in} \leq 10 \text{ V}$  | <a href="#">[1]</a> 3.217 | -     | 3.383 | V    |
|           | NX1117C50Z     | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 7.0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 4.950                     | 5.000 | 5.050 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $6.5 \text{ V} \leq V_{in} \leq 12 \text{ V}$   | <a href="#">[1]</a> 4.900 | -     | 5.100 | V    |
|           | NX1117CE50Z    | $I_{out} = 10 \text{ mA}$ ; $V_{in} = 7.0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 4.937                     | 5.000 | 5.063 | V    |
|           |                | $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ ; $6.5 \text{ V} \leq V_{in} \leq 12 \text{ V}$   | <a href="#">[1]</a> 4.875 | -     | 5.125 | V    |

**Table 8.** Characteristics ...continued

$C_{in} = 680 \text{ nF}$  in series with  $1 \Omega$ , and  $C_{out} = 680 \text{ nF}$  in series with  $1 \Omega$ . For typical value  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ ; for minimum and maximum values  $T_{amb}$  is the operating temperature range  $-40 \text{ }^{\circ}\text{C}$  to  $125 \text{ }^{\circ}\text{C}$ ; unless otherwise specified.

| Symbol                | Parameter                    | Conditions                                                                           | Min  | Typ  | Max  | Unit |
|-----------------------|------------------------------|--------------------------------------------------------------------------------------|------|------|------|------|
| V <sub>do</sub>       | dropout voltage              | measured at V <sub>out</sub> – 100 mV                                                |      |      |      |      |
|                       |                              | I <sub>out</sub> = 100 mA                                                            | -    | 0.95 | 1.1  | V    |
|                       |                              | I <sub>out</sub> = 500 mA                                                            | -    | 1.01 | 1.15 | V    |
|                       |                              | I <sub>out</sub> = 800 mA                                                            | -    | 1.07 | 1.2  | V    |
| I <sub>out(lim)</sub> | output current limit         | V <sub>in</sub> – V <sub>out</sub> = 5.0 V; T <sub>amb</sub> = 25 °C                 | 1000 | 1200 | 1500 | mA   |
| I <sub>q</sub>        | quiescent current            |                                                                                      |      |      |      |      |
|                       | NX1117C12Z;<br>NX1117CE12Z   | V <sub>in</sub> = 11.2 V                                                             | -    | 5    | 6    | mA   |
|                       | NX1117C15Z;<br>NX1117CE15Z   | V <sub>in</sub> = 11.5 V                                                             | -    | 5    | 6    | mA   |
|                       | NX1117C18Z;<br>NX1117CE18Z   | V <sub>in</sub> = 11.8 V                                                             | -    | 5    | 6    | mA   |
|                       | NX1117C19Z;<br>NX1117CE19Z   | V <sub>in</sub> = 11.9 V                                                             | -    | 5    | 6    | mA   |
|                       | NX1117C20Z;<br>NX1117CE20Z   | V <sub>in</sub> = 12 V                                                               | -    | 5    | 6    | mA   |
|                       | NX1117C25Z;<br>NX1117CE25Z   | V <sub>in</sub> = 10 V                                                               | -    | 5    | 6    | mA   |
|                       | NX1117C285Z;<br>NX1117CE285Z | V <sub>in</sub> = 10 V                                                               | -    | 5    | 6    | mA   |
|                       | NX1117C33Z;<br>NX1117CE33Z   | V <sub>in</sub> = 15 V                                                               | -    | 5    | 6    | mA   |
|                       | NX1117C50Z;<br>NX1117CE50Z   | V <sub>in</sub> = 15 V                                                               | -    | 5    | 6    | mA   |
| I <sub>adj</sub>      | adjust current               |                                                                                      |      |      |      |      |
|                       | NX1117CADJZ;<br>NX1117CEADJZ | V <sub>in</sub> = 11.25 V; I <sub>out</sub> = 800 mA                                 | -    | 52   | 120  | μA   |
| ΔI <sub>adj</sub>     | adjust current variation     |                                                                                      |      |      |      |      |
|                       | NX1117CADJZ;<br>NX1117CEADJZ | 1.4 V ≤ V <sub>in</sub> – V <sub>out</sub> ≤ 10 V; 10 mA ≤ I <sub>out</sub> ≤ 800 mA | -    | 0.4  | 5    | μA   |

**Table 8. Characteristics ...continued**

$C_{in} = 680 \text{ nF}$  in series with  $1 \Omega$ , and  $C_{out} = 680 \text{ nF}$  in series with  $1 \Omega$ . For typical value  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ ; for minimum and maximum values  $T_{amb}$  is the operating temperature range  $-40 \text{ }^{\circ}\text{C}$  to  $125 \text{ }^{\circ}\text{C}$ ; unless otherwise specified.

| Symbol                            | Parameter                     | Conditions                                                                                         | Min | Typ   | Max | Unit |
|-----------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------|-----|-------|-----|------|
| <b>Regulation characteristics</b> |                               |                                                                                                    |     |       |     |      |
| $I_{out(min)}$                    | minimum output current        | required for regulation                                                                            |     |       |     |      |
|                                   | NX1117CADJZ;<br>NX1117CEADJZ  | $V_{in} = 15 \text{ V}$                                                                            | -   | 0.8   | 5   | mA   |
| PSRR                              | power supply ripple rejection | $V_{in} - V_{out} = 2.4 \text{ V}$ ; $I_{out} = 40 \text{ mA}$ ;<br>$2 V_{(p-p)}$ 120 Hz sine wave |     |       |     |      |
|                                   | NX1117CADJZ;<br>NX1117CEADJZ  |                                                                                                    | -   | 69    | -   | dB   |
|                                   | NX1117C12Z;<br>NX1117CE12Z    |                                                                                                    | -   | 72    | -   | dB   |
|                                   | NX1117C15Z;<br>NX1117CE15Z    |                                                                                                    | -   | 69    | -   | dB   |
|                                   | NX1117C18Z;<br>NX1117CE18Z    |                                                                                                    | -   | 68    | -   | dB   |
|                                   | NX1117C19Z;<br>NX1117CE19Z    |                                                                                                    | -   | 67    | -   | dB   |
|                                   | NX1117C20Z;<br>NX1117CE20Z    |                                                                                                    | -   | 67    | -   | dB   |
|                                   | NX1117C25Z;<br>NX1117CE25Z    |                                                                                                    | -   | 65    | -   | dB   |
|                                   | NX1117C285Z;<br>NX1117CE285Z  |                                                                                                    | -   | 63    | -   | dB   |
|                                   | NX1117C33Z;<br>NX1117CE33Z    |                                                                                                    | -   | 62    | -   | dB   |
|                                   | NX1117C50Z;<br>NX1117CE50Z    |                                                                                                    | -   | 59    | -   | dB   |
| $V_{n(out)RMS}$                   | RMS output noise voltage      | $10 \text{ Hz} \leq f \leq 10 \text{ kHz}$                                                         | -   | 0.003 | -   | %    |

**Table 8. Characteristics ...continued**

$C_{in} = 680 \text{ nF}$  in series with  $1 \Omega$ , and  $C_{out} = 680 \text{ nF}$  in series with  $1 \Omega$ . For typical value  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ ; for minimum and maximum values  $T_{amb}$  is the operating temperature range  $-40 \text{ }^{\circ}\text{C}$  to  $125 \text{ }^{\circ}\text{C}$ ; unless otherwise specified.

| Symbol                 | Parameter                    | Conditions                                                                    | Min | Typ | Max | Unit |
|------------------------|------------------------------|-------------------------------------------------------------------------------|-----|-----|-----|------|
| <b>Line regulation</b> |                              |                                                                               |     |     |     |      |
| $\Delta V_{out}$       | output voltage variation     |                                                                               | [2] |     |     |      |
|                        | NX1117CADJZ;<br>NX1117CEADJZ | $I_{out} = 10 \text{ mA}$ ; $2.75 \text{ V} \leq V_{in} \leq 16.25 \text{ V}$ | -   | 0.1 | 0.3 | %    |
|                        | NX1117C12Z;<br>NX1117CE12Z   | $I_{out} = 0 \text{ mA}$ ; $2.6 \text{ V} \leq V_{in} \leq 11.2 \text{ V}$    | -   | 1.2 | 3.0 | mV   |
|                        | NX1117C15Z;<br>NX1117CE15Z   | $I_{out} = 0 \text{ mA}$ ; $2.9 \text{ V} \leq V_{in} \leq 11.5 \text{ V}$    | -   | 1.5 | 3.5 | mV   |
|                        | NX1117C18Z;<br>NX1117CE18Z   | $I_{out} = 0 \text{ mA}$ ; $3.2 \text{ V} \leq V_{in} \leq 11.8 \text{ V}$    | -   | 1.8 | 4.0 | mV   |
|                        | NX1117C19Z;<br>NX1117CE19Z   | $I_{out} = 0 \text{ mA}$ ; $3.3 \text{ V} \leq V_{in} \leq 11.9 \text{ V}$    | -   | 1.9 | 4.0 | mV   |
|                        | NX1117C20Z;<br>NX1117CE20Z   | $I_{out} = 0 \text{ mA}$ ; $3.4 \text{ V} \leq V_{in} \leq 12 \text{ V}$      | -   | 2.0 | 4.5 | mV   |
|                        | NX1117C25Z;<br>NX1117CE25Z   | $I_{out} = 0 \text{ mA}$ ; $3.9 \text{ V} \leq V_{in} \leq 12 \text{ V}$      | -   | 2.5 | 4.5 | mV   |
|                        | NX1117C285Z;<br>NX1117CE285Z | $I_{out} = 0 \text{ mA}$ ; $4.25 \text{ V} \leq V_{in} \leq 10 \text{ V}$     | -   | 2.5 | 4.5 | mV   |
|                        | NX1117C33Z;<br>NX1117CE33Z   | $I_{out} = 0 \text{ mA}$ ; $4.75 \text{ V} \leq V_{in} \leq 10 \text{ V}$     | -   | 2.5 | 4.5 | mV   |
|                        | NX1117C50Z;<br>NX1117CE50Z   | $I_{out} = 0 \text{ mA}$ ; $6.5 \text{ V} \leq V_{in} \leq 12 \text{ V}$      | -   | 6.0 | 10  | mV   |

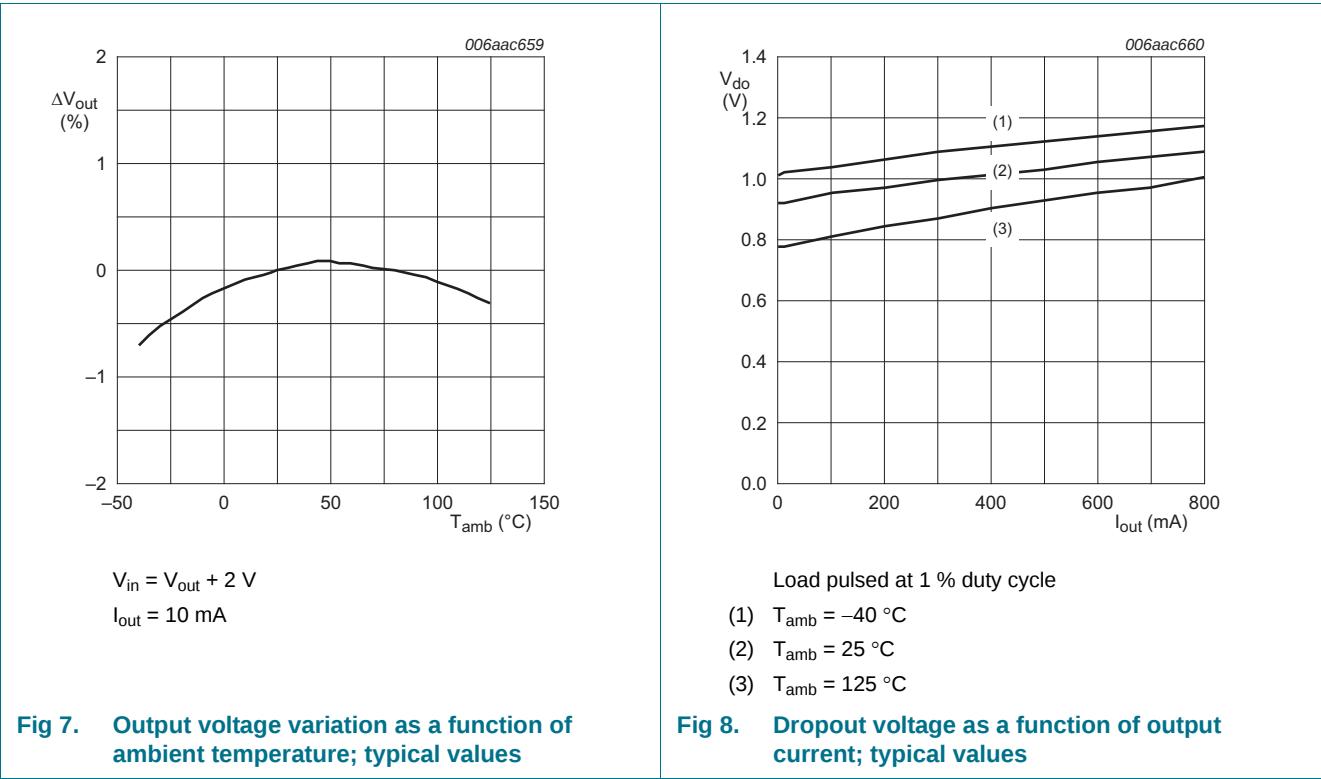
**Load regulation**

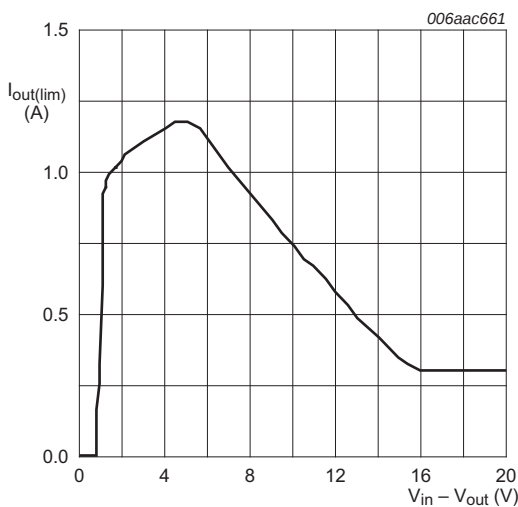
|                  |                              |                                                                                       |     |     |     |    |
|------------------|------------------------------|---------------------------------------------------------------------------------------|-----|-----|-----|----|
| $\Delta V_{out}$ | output voltage variation     |                                                                                       | [2] |     |     |    |
|                  | NX1117CADJZ;<br>NX1117CEADJZ | $V_{in} - V_{out} = 1.4 \text{ V}$ ; $10 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$ | -   | 0.2 | 0.4 | %  |
|                  | NX1117C12Z;<br>NX1117CE12Z   | $V_{in} = 2.6 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 4   | mV |
|                  | NX1117C15Z;<br>NX1117CE15Z   | $V_{in} = 2.9 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 5   | mV |
|                  | NX1117C18Z;<br>NX1117CE18Z   | $V_{in} = 3.2 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 5   | mV |
|                  | NX1117C19Z;<br>NX1117CE19Z   | $V_{in} = 3.3 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 6   | mV |
|                  | NX1117C20Z;<br>NX1117CE20Z   | $V_{in} = 3.4 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 6   | mV |
|                  | NX1117C25Z;<br>NX1117CE25Z   | $V_{in} = 3.9 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 6   | mV |
|                  | NX1117C285Z;<br>NX1117CE285Z | $V_{in} = 4.25 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$           | -   | 1   | 7   | mV |
|                  | NX1117C33Z;<br>NX1117CE33Z   | $V_{in} = 4.75 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$           | -   | 1   | 7   | mV |
|                  | NX1117C50Z;<br>NX1117CE50Z   | $V_{in} = 6.5 \text{ V}$ ; $0 \text{ mA} \leq I_{out} \leq 800 \text{ mA}$            | -   | 1   | 10  | mV |

**Table 8. Characteristics ...continued**  
*C<sub>in</sub> = 680 nF in series with 1 Ω, and C<sub>out</sub> = 680 nF in series with 1 Ω. For typical value T<sub>amb</sub> = 25 °C; for minimum and maximum values T<sub>amb</sub> is the operating temperature range –40 °C to 125 °C; unless otherwise specified.*

| Symbol                | Parameter                | Conditions                                             | Min | Typ | Max | Unit |
|-----------------------|--------------------------|--------------------------------------------------------|-----|-----|-----|------|
| Temperature stability |                          |                                                        |     |     |     |      |
| ΔV <sub>out</sub>     | output voltage variation | –40 °C ≤ T <sub>amb</sub> ≤ 125 °C                     | -   | 0.7 | -   | %    |
| Long-term stability   |                          |                                                        |     |     |     |      |
| ΔV <sub>out</sub>     | output voltage variation | 1000 h end-point measurement; T <sub>amb</sub> = 25 °C | -   | 0.3 | -   | %    |

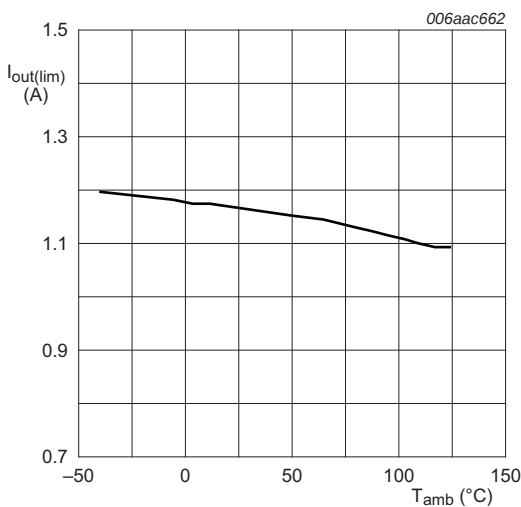
- [1] The SOA control limits the output current at high voltage differences V<sub>in</sub> – V<sub>out</sub> in order to keep the device in the safe operating area.
- [2] During testing low duty cycle pulse techniques are used to maintain the junction temperature as close to ambient as possible.





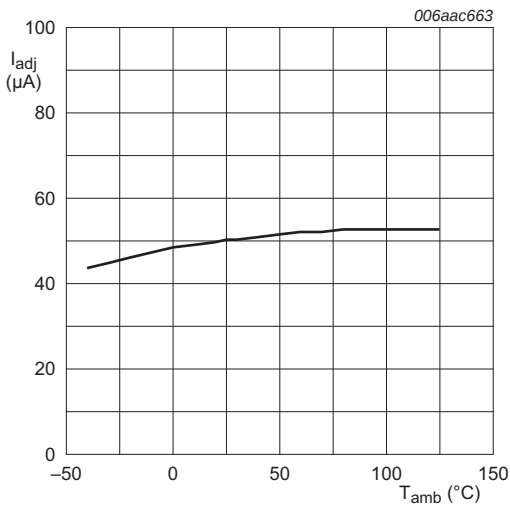
$T_{amb} = 25\text{ }^{\circ}\text{C}$   
Load pulsed at 1 % duty cycle

Fig 9. Output current limit as a function of voltage difference  $V_{in} - V_{out}$



$V_{in} = 5\text{ V}$   
Load pulsed at 1 % duty cycle

Fig 10. Output current limit as a function of ambient temperature



$V_{in} = 3.25\text{ V}$   
 $I_{out} = 10\text{ mA}$

Fig 11. Adjustable output voltage versions: Adjust current as a function of ambient temperature; typical values

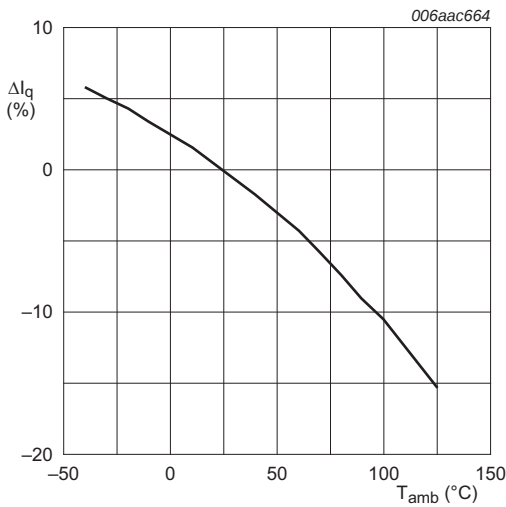
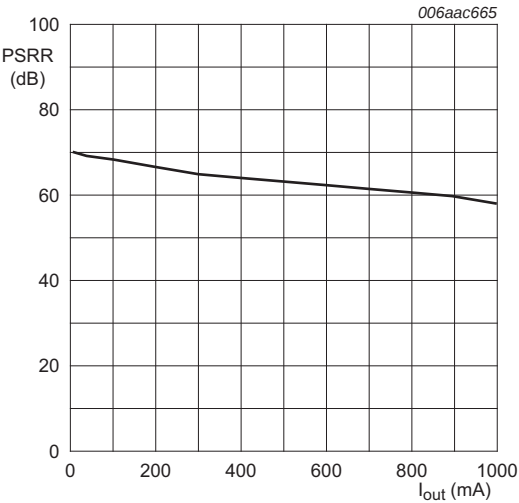
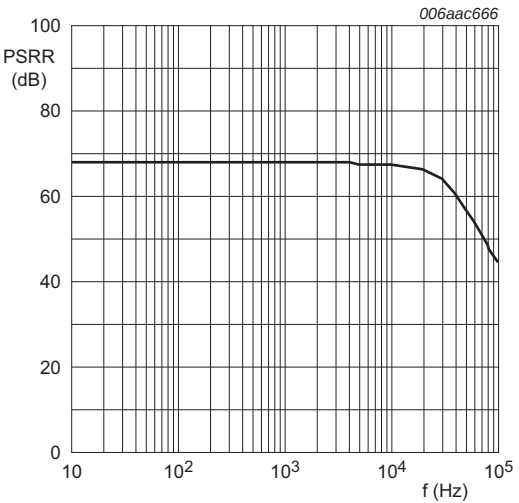


Fig 12. Fixed output voltage versions: Quiescent current variation as a function of ambient temperature; typical values



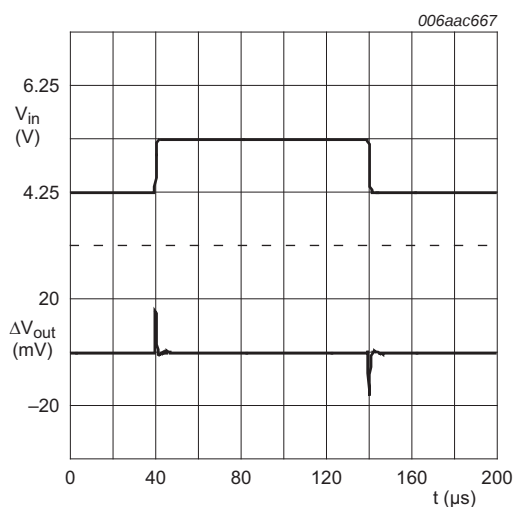
$V_{out} = 1.25\text{ V};$   
 $V_{in} - V_{out} = 2.4\text{ V};$   
 $C_{out} = 680\text{ nF};$   
 $T_{amb} = 25\text{ }^{\circ}\text{C};$   
 $2\text{ V}_{(p-p)}; 120\text{ Hz sine wave}$

Fig 13. Adjustable output voltage versions:  
Power supply ripple rejection as a function of  
output current; typical values



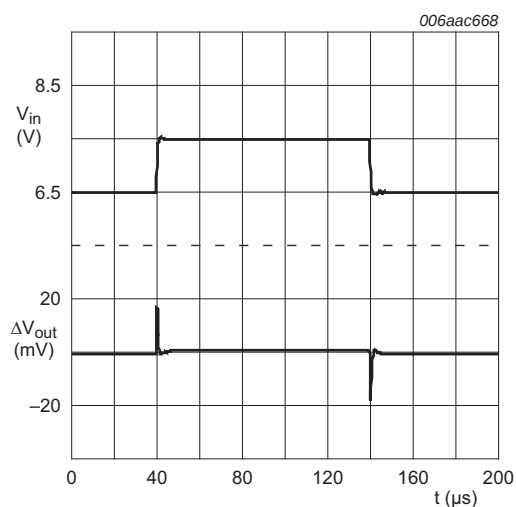
$V_{in} - V_{out} = 2.4\text{ V};$   
 $I_{out} = 40\text{ mA};$   
 $C_{out} = 10\text{ }\mu\text{F};$   
 $T_{amb} = 25\text{ }^{\circ}\text{C};$   
 $2\text{ V}_{(p-p)}$

Fig 14. Power supply ripple rejection as a function of  
frequency; typical values



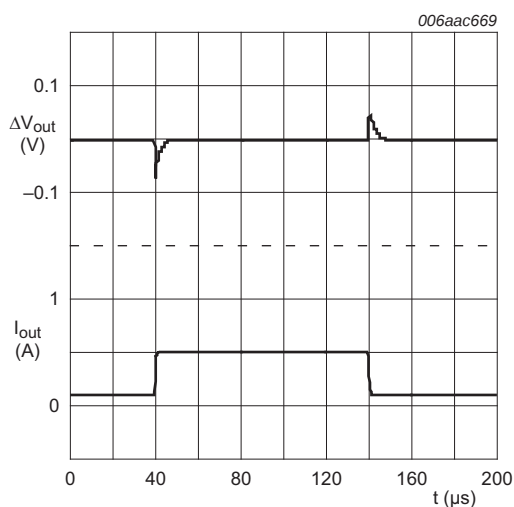
$C_{out} = 10 \mu F$ ;  
 $I_{out} = 100 \text{ mA}$ ;  
 $T_{amb} = 25^\circ \text{C}$

**Fig 15. NX1117C285Z and NX1117CE285Z:**  
 Line transient response as a function of time;  
 typical values



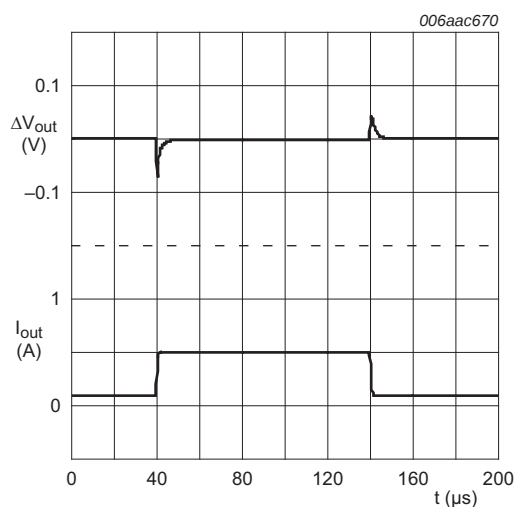
$C_{out} = 10 \mu F$ ;  
 $I_{out} = 100 \text{ mA}$ ;  
 $T_{amb} = 25^\circ \text{C}$

**Fig 16. NX1117C50Z and NX1117CE50Z:**  
 Line transient response as a function of time;  
 typical values



$C_{in} = 10 \mu F$ ;  
 $C_{out} = 10 \mu F$ ;  
 $V_{in} = 4.5 \text{ V}$ ;  
 $T_{amb} = 25^\circ \text{C}$ ;  
 Preload = 100 mA

**Fig 17. NX1117C285Z and NX1117CE285Z:**  
 Load transient response as a function of time;  
 typical values



$C_{in} = 10 \mu F$ ;  
 $C_{out} = 10 \mu F$ ;  
 $V_{in} = 6.5 \text{ V}$ ;  
 $T_{amb} = 25^\circ \text{C}$ ;  
 Preload = 100 mA

**Fig 18. NX1117C50Z and NX1117CE50Z:**  
 Load transient response as a function of time;  
 typical values

## 12. Application information

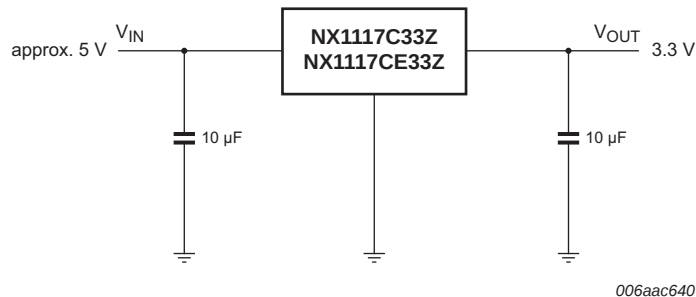
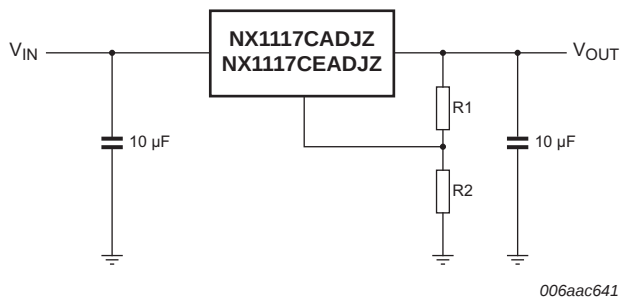


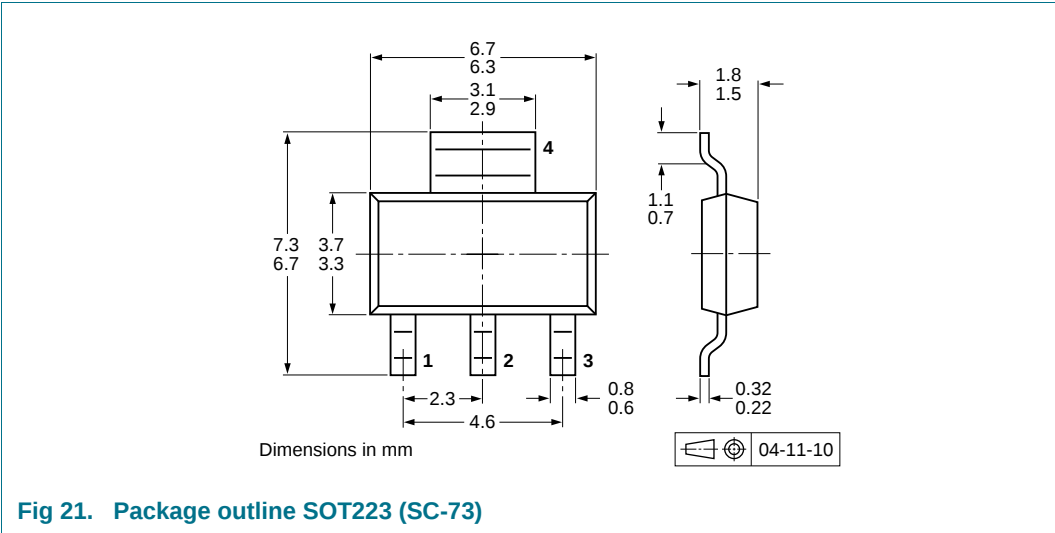
Fig 19. NX1117C33Z and NX1117CE33Z: Typical application for fixed output voltage versions



$$V_{OUT} = V_{ref} \times (1 + R_2/R_1) + I_{adj} \times R_2$$

Fig 20. NX1117CADJZ and NX1117CEADJZ: Typical application for adjustable output voltage versions

13. Package outline

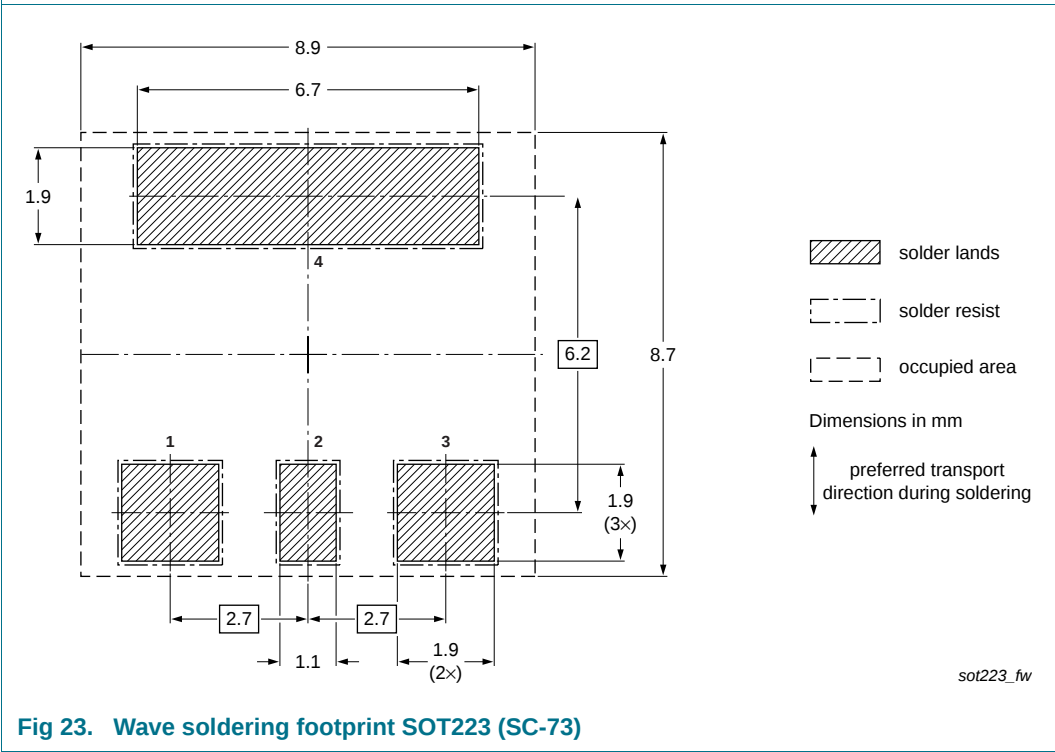
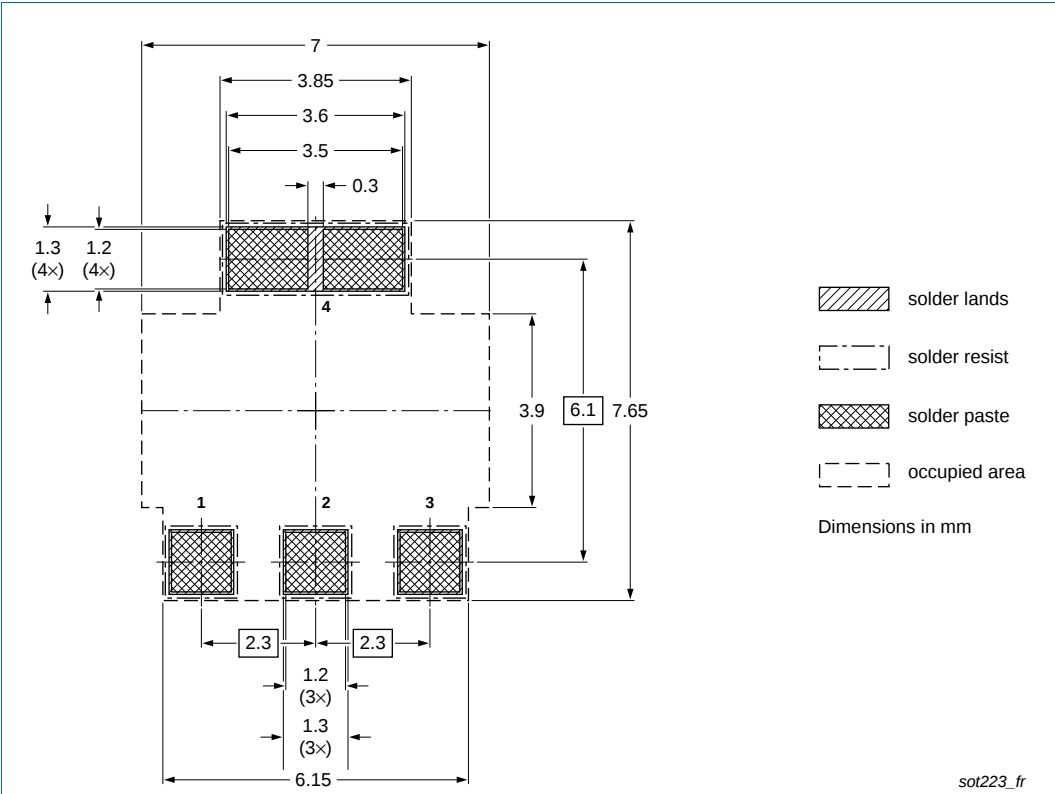


14. Packing information

| Type number             | Package | Description                     | Packing quantity |      |
|-------------------------|---------|---------------------------------|------------------|------|
|                         |         |                                 | 1000             | 4000 |
| NX1117C/NX1117CE series | SOT223  | 8 mm pitch, 12 mm tape and reel | -115             | -135 |

[1] For further information and the availability of packing methods, see [Section 18](#).

15. Soldering



## 16. Revision history

**Table 10.** Revision history

| Document ID                                                                                                                                                                                                                                                                      | Release date | Data sheet status  | Change notice | Supersedes               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|---------------|--------------------------|
| NX1117C_NX1117CE_SER v.2                                                                                                                                                                                                                                                         | 20121211     | Product data sheet | -             | NX1117C_NX1117CE_SER v.1 |
| Modifications:                                                                                                                                                                                                                                                                   |              |                    |               |                          |
| <ul style="list-style-type: none"><li>• <a href="#">Table 7 "Thermal characteristics"</a>: added shutdown temperature <math>T_{sd}</math></li><li>• Electrostatic discharge voltage <math>V_{ESD}</math> moved from <a href="#">Table 8</a> to <a href="#">Table 5</a></li></ul> |              |                    |               |                          |
| NX1117C_NX1117CE_SER v.1                                                                                                                                                                                                                                                         | 20110718     | Product data sheet | -             | -                        |

## 17. Legal information

### 17.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition                                                                            |
|-----------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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