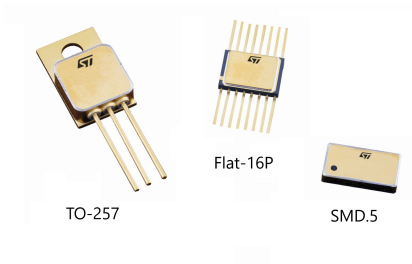


## Rad-hard positive fixed voltage regulator



### Features

- 2 and 3 A low dropout voltage
- Embedded overtemperature and overcurrent protection
- Adjustable current limitation
- Output overload monitoring/signalling
- Fixed 2.5 V, 3.3 V, 5.0 V output voltages
- Inhibit (ON/OFF) TTL-compatible control
- Programmable output short-circuit current
- Remote sensing operation
- Rad-hard: tested up to 300 krad Mil Std 883E Method 1019.6 low dose rate conditions
- Heavy Ion, SEL immune
- QML-V qualified, DLA SMD are 5962F02534 / 02535 / 02536

### Description

The RHFL4913XX25, RHFL4913XX33 and RHFL4913XX50 belong to a high-performance rad-hard positive fixed voltage regulator family. Available in various hermetic ceramic packages, they are suitable for harsh environments. Input supply range is up to 12 V. These devices are QML-V qualified, DLA SMD are 5962F02534 / 02535 / 02536.

#### Maturity status link

RHFL4913XX25, RHFL4913XX33 and  
RHFL4913XX50

# 1 Diagram

Figure 1. Block diagram for package SMD.5 and TO-257

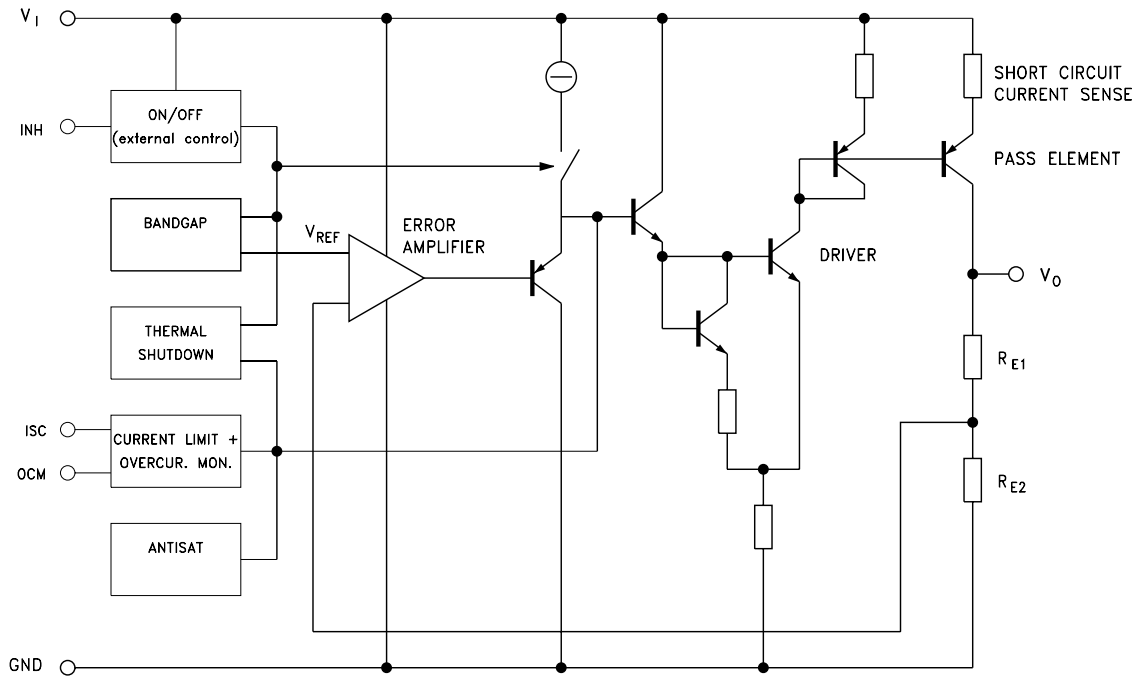
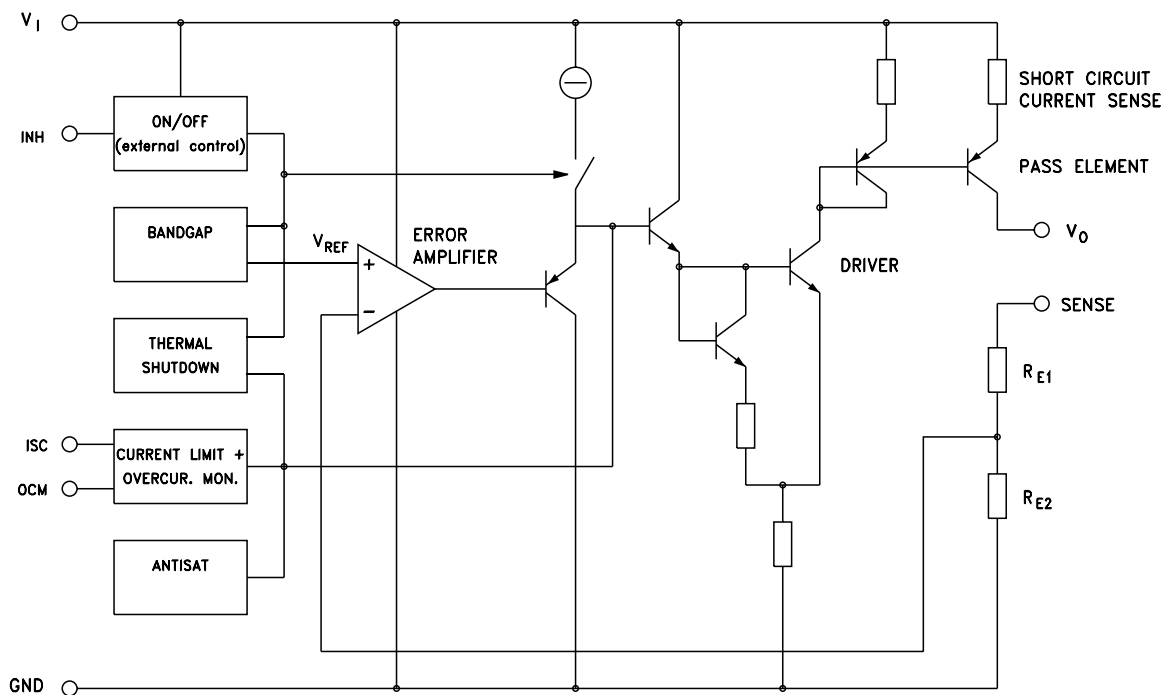


Figure 2. Block diagram for package FLAT-16P



## 2 Pin configuration

Figure 3. Pin configuration (top view for FLAT-16P, bottom view for SMD.5)

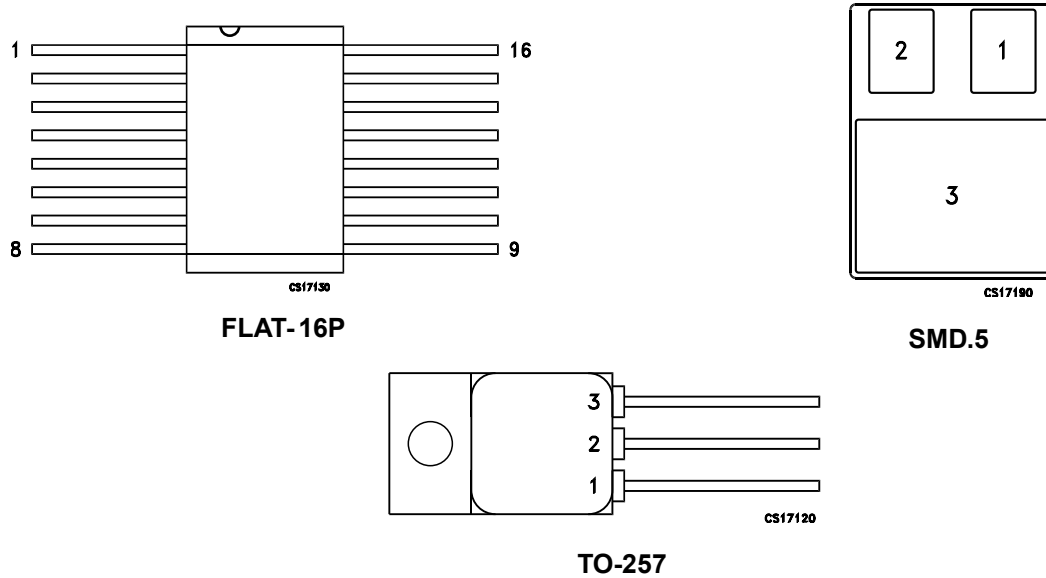


Table 1. Pin description

| Pin name        | FLAT-16P <sup>(1)</sup> | SMD.5 <sup>(2)</sup> | TO-257 |
|-----------------|-------------------------|----------------------|--------|
| V <sub>O</sub>  | 1, 2, 6, 7              | 1                    | 3      |
| V <sub>I</sub>  | 3, 4, 5                 | 2                    | 1      |
| GND             | 13                      | 3                    | 2      |
| I <sub>sc</sub> | 8                       |                      |        |
| OCM             | 10                      |                      |        |
| INHIBIT         | 14                      |                      |        |
| SENSE           | 16                      |                      |        |
| NC              | 9, 11, 12, 15           |                      |        |

1. The upper metallic package lid and the bottom metallization are neither connected to regulator die nor to package terminals, hence electrically floating.
2. The upper metallic package lid is neither connected to regulator die nor to package terminals, hence electrically floating.

### 3 Maximum ratings

**Table 2. Recommended maximum operating ratings**

| Symbol           | Parameter  | Value       | Unit |
|------------------|--|-------------|------|
| $V_I$            | DC input voltage, $V_I - V_{\text{GROUND}}$            | 14          | V    |
| $I_O$            | Output current ( RHFL4913S, ESY)                       | 3           | A    |
|                  | Output current ( RHFL4913KP)                           | 2           |      |
| $P_D$            | $T_C = 25\text{ °C}$ power dissipation (KP, S version) | 15          | W    |
|                  | $T_C = 25\text{ °C}$ power dissipation (ESY version)   | 10          |      |
| $T_{\text{STG}}$ | Storage temperature range                              | -65 to +150 | °C   |
| $T_{\text{OP}}$  | Operating junction temperature range                   | -55 to +150 | °C   |
| $T_J$            | Junction temperature <sup>(1)</sup>                    | +150        | °C   |
| $E_{\text{SD}}$  | Electrostatic discharge capability                     | Class 3     |      |

1. Internally limited to about maximum +175 °C by thermal shutdown circuit.

Note: Exceeding maximum ratings may damage the device.

**Table 3. Thermal data**

| Symbol            | Parameter                             | FLAT-16P | TO-257 | SMD.5 | Unit |
|-------------------|---------------------------------------|----------|--------|-------|------|
| $R_{\text{thJC}}$ | Thermal resistance junction-case max. | 8.3      | 12.5   | 8.3   | °C/W |
| $T_{\text{SOLD}}$ | Maximum soldering temperature, 10 s   | 300      |        |       | °C   |

## 4 Electrical characteristics

$T_J = 25\text{ °C}$ ,  $V_I = V_O + 2.5\text{ V}$ ,  $C_I = C_O = 1\text{ }\mu\text{F}$ , unless otherwise specified.

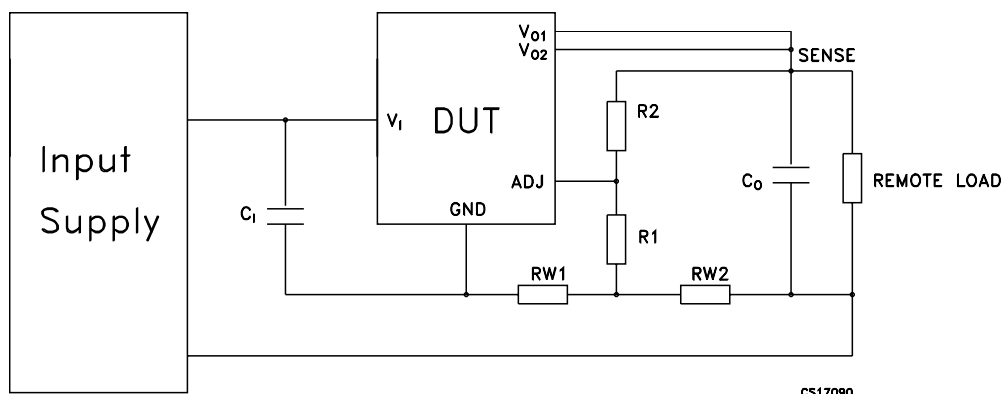
**Table 4. Electrical characteristics**

| Symbol                  | Parameter                           | Test conditions   | Min. | Typ. | Max. | Unit |
|-------------------------|-------------------------------------|---|------|------|------|------|
| $V_I$                   | Operating input voltage             | $I_O = 2\text{ A (FLAT-16P) or } 3\text{ A (SMD.5 and TO-257)}$                             |      |      | 12   | V    |
| $V_O$                   | Output voltage accuracy             | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA}$  | -2   |      | 2    | %    |
| $I_{\text{SHORT}}$      | Output current limit <sup>(1)</sup> | Adjustable by mask/external resistor  |      | 4.5  |      | A    |
| $V_O$                   | Operating output voltage            | $I_O = 2\text{ A}$ , 2.5 V output voltage   | 2.45 |      | 2.55 | V    |
|                         |                                     | $I_O = 2\text{ A}$ , 3.3 V output voltage   | 3.23 |      | 3.37 |      |
|                         |                                     | $I_O = 2\text{ A}$ , 5.0 V output voltage   | 4.9  |      | 5.1  |      |
| $\Delta V_O/\Delta V_I$ | Line regulation                     | $V_I = V_O + 2.5\text{ V to } 12\text{ V}$ , $I_O = 5\text{ mA}$ (+25 °C)                   |      |      | 0.3  | %    |
|                         |                                     | $V_I = V_O + 2.5\text{ V to } 12\text{ V}$ , $I_O = 5\text{ mA}$ (-55 °C)                   |      |      | 0.4  |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V to } 12\text{ V}$ , $I_O = 5\text{ mA}$ (+125 °C)                  |      |      | 0.4  |      |
| $\Delta V_O/\Delta V_O$ | Load regulation                     | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA to } 400\text{ mA}$ (+25 °C)                 |      |      | 0.2  | %    |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA to } 400\text{ mA}$ (-55 °C)                 |      |      | 0.3  |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA to } 400\text{ mA}$ (+125 °C)                |      |      | 0.3  |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA to } 1\text{ A}$ (+25 °C)                    |      |      | 0.3  |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA to } 1\text{ A}$ (-55 °C)                    |      |      | 0.4  |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ , $I_O = 5\text{ mA to } 1\text{ A}$ (125 °C)                    |      |      | 0.4  |      |
| $Z_{\text{OUT}}$        | Output impedance                    | $I_O = 100\text{ mA DC and } 20\text{ mA rms}$  |      | 100  |      | mΩ   |
| $I_q$                   | Quiescent current                   | $V_I = V_O + 2.5\text{ V}$ ,<br>$I_O = 30\text{ mA}$ ,<br>ON mode (+25 °C)                  |      |      | 8    | mA   |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ ,<br>$I_O = 300\text{ mA}$ ,<br>ON mode                          |      |      | 25   |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ ,<br>$I_O = 1\text{ mA}$ ,<br>ON mode                            |      |      | 60   |      |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ ,<br>$I_O = 3\text{ A}$ ,<br>ON mode (only for SMD.5 and TO-257) |      |      | 150  |      |
|                         |                                     | $V_I = V_O + 2\text{ V}$ , $V_{\text{INH}} = 2.4\text{ V}$ , off mode                       |      |      | 1    |      |
| $I_q$                   | Quiescent current                   | $V_I = V_O + 2.5\text{ V}$ ,<br>$I_O = 1\text{ mA}$ , ( $T_J = +125\text{ °C}$ , on mode)   |      |      | 40   | mA   |
|                         |                                     | $V_I = V_O + 2.5\text{ V}$ ,<br>$I_O = 1\text{ A}$ , ( $T_J = -55\text{ °C}$ , on mode)     |      |      | 100  |      |

| Symbol                               | Parameter                                | Test conditions   | Min.   | Typ. | Max. | Unit  |
|--------------------------------------|--|---|--------|------|------|-------|
| V <sub>d</sub>                       | Dropout voltage                          | I <sub>O</sub> = 400 mA, T <sub>J</sub> = -55 °C  |        | 300  | 400  | mV    |
|                                      |  | I <sub>O</sub> = 400 mA, T <sub>J</sub> = +25 °C  |        | 350  | 450  |       |
|                                      |  | I <sub>O</sub> = 400 mA, T <sub>J</sub> = +125 °C   |        | 450  | 550  |       |
|                                      |  | I <sub>O</sub> = 1 A, T <sub>J</sub> = -55 °C   |        |      | 550  |       |
|                                      |  | I <sub>O</sub> = 1 A, T <sub>J</sub> = +25 °C   |        |      | 650  |       |
|                                      |  | I <sub>O</sub> = 1 A, T <sub>J</sub> = +125 °C  |        |      | 800  |       |
|                                      |  | I <sub>O</sub> = 2 A, T <sub>J</sub> = +25 °C   |        | 750  |      |       |
|                                      |  | I <sub>O</sub> = 2 A, T <sub>J</sub> = +125 °C  |        | 950  |      |       |
| V <sub>INH(ON)</sub>                 | Inhibit voltage                          | I <sub>O</sub> = 5 mA, T <sub>J</sub> = -55 to +125 °C  |        |      | 0.8  | V     |
| V <sub>INH(OFF)</sub>                | Inhibit voltage                          | I <sub>O</sub> = 5 mA, T <sub>J</sub> = -55 to +125 °C  | 2.4    |      |      |       |
| SVR                                  | Supply voltage rejection <sup>(1)</sup>  | V <sub>I</sub> = V <sub>O</sub> + 2.5 V ± 1 V,<br>I <sub>O</sub> = 5 mA<br>f = 120 Hz             | 60     | 70   |      | dB    |
|                                      |  | V <sub>I</sub> = V <sub>O</sub> + 2.5 V ± 1 V,<br>I <sub>O</sub> = 5 mA<br>f = 33 kHz             | 30     | 40   |      |       |
| I <sub>SH</sub>                      | Shutdown input current                   | V <sub>INH</sub> = 5 V  |        | 15   |      | μA    |
| V <sub>OCM</sub>                     | OCM pin voltage                          | Sinked I <sub>OCM</sub> = 24 mA active low  |        | 0.38 |      | V     |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Inhibit propagation delay <sup>(1)</sup> | V <sub>I</sub> = V <sub>O</sub> + 2.5 V,<br>V <sub>INH</sub> = 2.4 V,<br>I <sub>O</sub> = 400 mA, | ON-OFF |      | 20   | μs    |
|                                      |  |   | OFF-ON |      | 100  | μs    |
| eN                                   | Output noise voltage <sup>(1)</sup>      | B = 10 Hz to 100 kHz,<br>I <sub>O</sub> = 5 mA to 2 A   |        | 40   |      | μVrms |

1. These values are guaranteed by design. For each application it is strongly recommended to comply with the maximum current limit of the package used.

**Figure 4. Application diagram for remote sensing operation**



CS17090

## 5 Device description

The RHFL4913 fixed voltage contains a PNP type power element controlled by a signal resulting from amplified comparison between the internal temperature compensated band-gap cell and the fraction of the desired output voltage value. This fractional value is obtained from an internal-to-die resistor divider bridge set by STMicroelectronics. The device is protected by several functional blocks.

### 5.1 Low pin count package limitations

Some functions (INHIBIT, OCM, SENSE) are not available due to lack of pins. Corresponding die pads are by default connected inside silicon.

### 5.2 SENSE pin

The load voltage is applied by a Kelvin line connected to SENSE pin: Voltage feedback comes from the internal divider resistor bridge. Therefore possible output voltages are set by manufacturer mask metal options. SENSE pin is not available in 3-pin packages.

### 5.3 Inhibit ON-OFF control

By setting the INHIBIT pin TTL high, the device switches off the output current and voltage. The device is ON when the INHIBIT pin is set low. Since the INHIBIT pin is pulled down internally, it can be left floating in cases where the inhibit function is not used. INHIBIT pin is not available in 3-pin packages.

### 5.4 Overtemperature protection

A temperature detector internally monitors the power element junction temperature. The device turns off when a temperature of approximately 175 °C is reached, returning to ON mode when back to approximately 40 °C. It should be noted that when the internal temperature detector reaches 175 °C, the active power element can be at 225 °C: the device reliability cannot be guaranteed in case of extensive operation under these conditions.

### 5.5 Overcurrent protection

$I_{SC}$  pin. An internal non-fold back short-circuit limitation is set with  $I_{SHORT} > 3.8$  A ( $V_O$  is 0 V). This value can be reduced by an external resistor connected between  $I_{SC}$  pin and  $V_I$  pin, with a typical value range of 25 k $\Omega$  to 200 k $\Omega$ . This adjustment feature is not available in 3-pin packages. To keep excellent  $V_O$  regulation, it is necessary to set  $I_{SHORT}$  1.6 times greater than the maximum desired application  $I_O$ . When  $I_O$  reaches  $I_{SHORT} - 300$  mA, the current limiter overrules regulation and  $V_O$  starts to drop and the OCM flag is risen. When no current limitation adjustment is required,  $I_{SC}$  pin must be left unbiased (as it is in 3 pin-packages).

### 5.6 OCM pin

The OCM pin goes low when the current limit becomes active, otherwise  $V_{OCM} = V_I$ . It is buffered and can sink 10 mA. The OCM pin is internally pulled up by a 5 k $\Omega$  resistor. Not available in 3-pin packages.

### 5.7 Alternate to

The RHFL4913 fixed (and custom) voltages replace all 3-terminal industry devices, providing essential benefits

- Lower dropout
- High radiation performance
- Better SVR
- Saving the high stability external setting resistors

## 6 Application information

The RHFL4913 fixed voltage is functional as soon as  $V_I - V_O$  voltage difference is slightly above the power element saturation voltage. A minimum 0.5 mA  $I_O$  ensures perfect “no-load” regulation.

All available  $V_I$  pins must always be externally interconnected, same thing for all available  $V_O$  pins, otherwise device stability and reliability cannot be granted. All NC pins can be connected to ground. The INHIBIT function switches off the output current in an electronic way, that is very quickly. According to Lenz’s law, external circuitry reacts with  $-Ldi/dt$  terms which can be of high amplitude in case some series-inductance exists. The effect would be a large transient voltage developed on both device terminals. It is necessary to protect the device with Schottky diodes preventing negative voltage excursions. In the worst case, a 14 V Zener diode shall protect the device input.

The device has been designed for high stability and low dropout operation: minimum 1  $\mu$ F input and output tantalum capacitors are therefore mandatory. Capacitor ESR range is from 0.01  $\Omega$  to over 20  $\Omega$ . Such range turns out to be useful when ESR increases at low temperature. When large transient currents are expected, larger value capacitors are necessary.

In case of high current operation with expected short-circuit events, caution must be considered relatively to capacitors. They must be connected as close as possible to device terminals. As some tantalum capacitors may permanently fail when submitted to high charge-up surge currents, it is recommended to decouple them with 470 nF polyester capacitors.

Being the RHFL4913 fixed voltage manufactured with very high speed bipolar technology (6 GHz fT transistors), the PCB lay-out must be performed with extreme care, very low inductance, low mutually coupling lines, otherwise high frequency parasitic signals may be picked-up by the device resulting into self-oscillation. User’s benefit is a SVR performance extended to far higher frequencies.

### 6.1 Remote sensing operation

In case the load is located far from the regulator, it is recommended to comply with the scheme below. To obtain the best regulation, it is in addition essential to care about:

- The wire connecting R2 to the load end must not be crossed by the load current (Kelvin sense)

The noise captured by the wires between the load and the chip could bring a noisy output voltage. In case this happens, it is recommended that shielded cables are used for these connections. The external wrap must be used for connecting the ground of the chip with the load ground. It is also recommended to place 1  $\mu$ F tantalum capacitors between output and ground close to the device and another next to the load.



## 7 Notes about FLAT-16P package

The bottom of package is metallized to allow user to directly solder the voltage regulator to PCB, no heat sink needed, in order to optimize heat removal performance.

This AlN ceramic package features a low thermal coefficient of expansion (TCE) significantly lower than the TCE of some PCBs. TCE= 4.7 ppm/K; Thermal conductivity= 150 W/mK.

It is therefore recommended, especially when its bottom metallic dissipation plate is brazed (as opposed to glued), to carefully design the PCB (material, thickness, layout...) and the mounting process to secure that the package and the solder joint can sustain the worst case temperature cycling its must be qualified for ( the highest constraints are at lowest temperature). It is strongly recommended to make sure that the actual mounting is well covered by the qualified mounting process for each parameters (PCB material, thickness, layout, temperature profile...).

### 7.1 Radiation performance

The RHFL4913F has been tested against: 300 krad TID ELDERS in accordance with Mil-1019.6, bipolar section: post radiation parameters are within datasheet pre-rad limits.

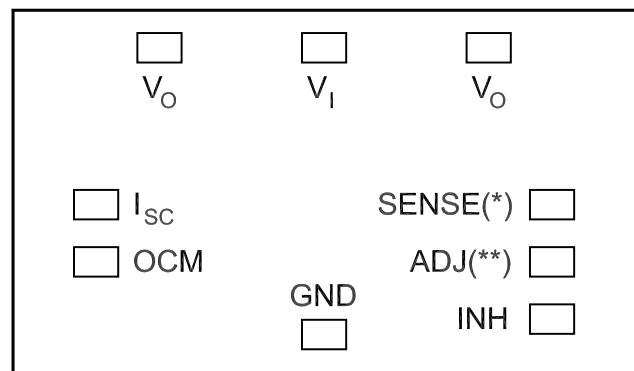
Submitted to 200 MeV Iodine ions of 60.4 MeV/cm<sup>2</sup>/mg LET up to 1exp(+7) ions / cm<sup>2</sup>, no SEL event has been detected.

### 7.2 Die information

The RHFL4913 fixed is also available in die form. Space dice are electrically tested by STMicroelectronics in such a way that, when mounted in proper thermal and electrical substrate, they provide full compliance with equivalent packaged product.

- Max. die dimensions: 2.794 mm by 3.861 mm or 110 mils by 152 mils
- Die thickness: 357 μm +/- 50 μm
- Pad size: 184 μm by 184 μm
- Metallization: Aluminum 4% silicon alloy
- Die backside: Bare silicon
- Die backside potential: Ground

**Figure 5. Die size**



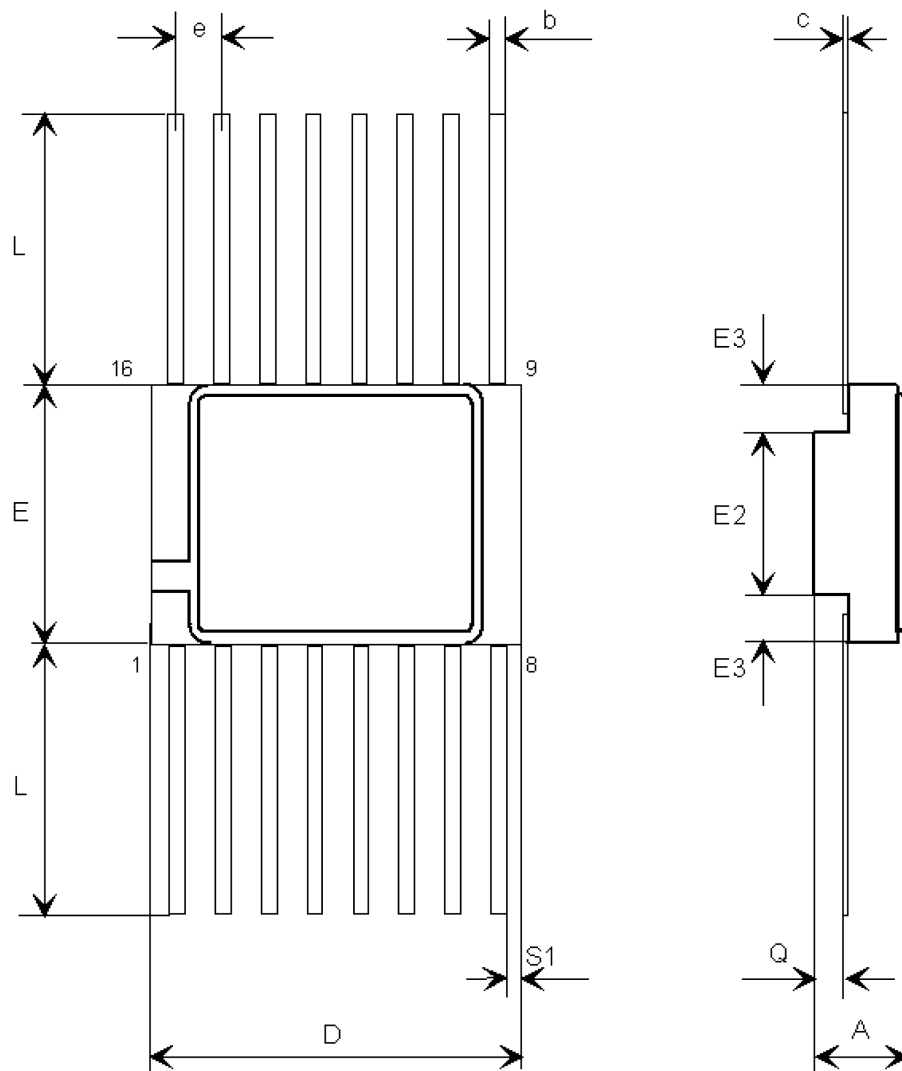
**Note:** Die SENSE pad is active in the RHFL4913 fixed die. It shall not be left unbonded. It should be bonded to  $V_O$  pin. Die adjust pad is available in the die layout but is not electrically connected to the IC. It shall be left unconnected during hybrid bonding.

## 8 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 8.1 FLAT-16P package information

Figure 6. FLAT-16P package outline



7450901\_D

**Table 5. FLAT-16P package mechanical data**

| Dim. | mm   |      |       |
|------|------|------|-------|
|      | Min. | Typ. | Max.  |
| A    | 2.42 |      | 2.88  |
| b    | 0.38 |      | 0.48  |
| c    | 0.10 |      | 0.18  |
| D    | 9.71 |      | 10.11 |
| E    | 6.71 |      | 7.11  |
| E2   | 3.30 | 3.45 | 3.60  |
| E3   | 0.76 |      |       |
| e    |      | 1.27 |       |
| L    | 6.35 |      | 7.36  |
| Q    | 0.66 |      | 1.14  |
| S1   | 0.13 |      |       |

## 8.2 SMD.5 package information

Figure 7. SMD.5 package outline

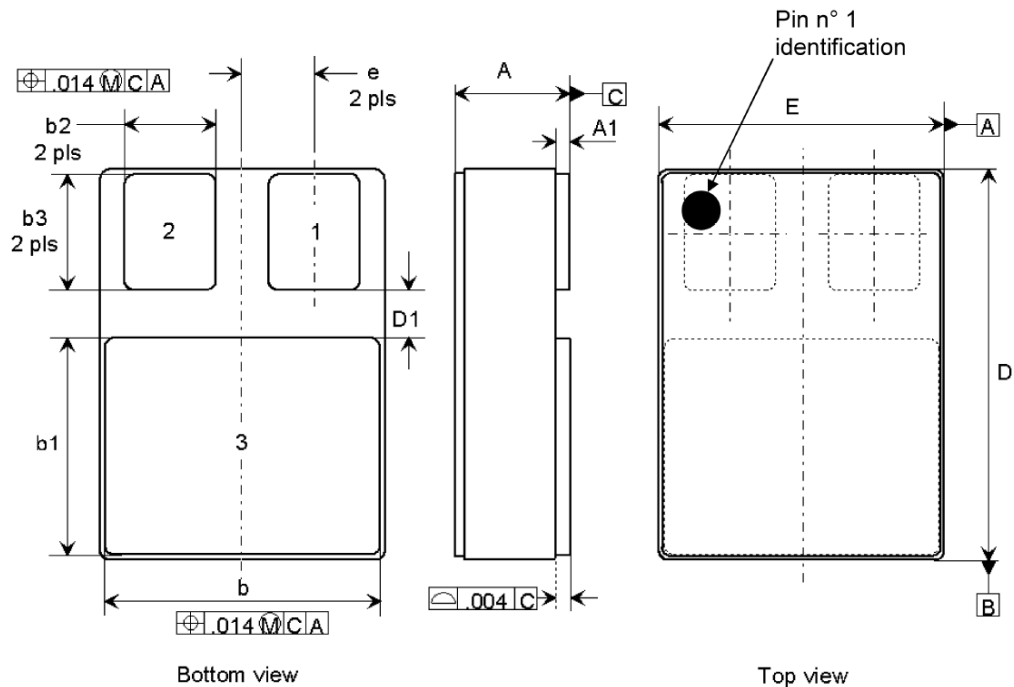


Table 6. SMD.5 package mechanical data

| Dim. | mm    |       |       |
|------|-------|-------|-------|
|      | Min.  | Typ.  | Max.  |
| A    | 2.84  | 3.00  | 3.15  |
| A1   | 0.25  | 0.38  | 0.51  |
| b    | 7.13  | 7.26  | 7.39  |
| b1   | 5.58  | 5.72  | 5.84  |
| b2   | 2.28  | 2.41  | 2.54  |
| b3   | 2.92  | 3.05  | 3.18  |
| D    | 10.03 | 10.16 | 10.28 |
| D1   | 0.76  |       |       |
| E    | 7.39  | 7.52  | 7.64  |
| e    |       | 1.91  |       |

### 8.3 TO-257 package information

Figure 8. TO-257 package outline

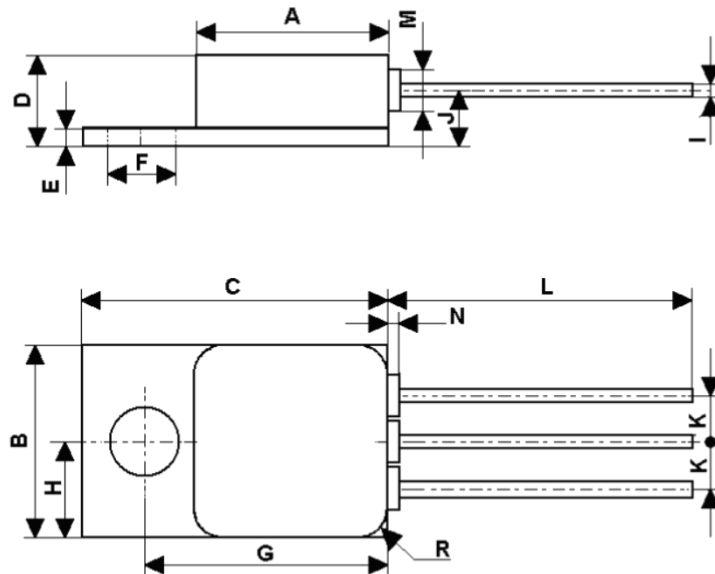


Table 7. TO-257 package mechanical data

| Dim. | mm   |       |      | Inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | Min. | Typ.  | Max. | Min.  | Typ.  | Max.  |
| A    |      | 10.54 |      |       | 0.415 |       |
| B    |      | 10.54 |      |       | 0.415 |       |
| C    |      | 16.64 |      |       | 0.655 |       |
| D    | 4.7  |       | 5.33 | 0.185 |       | 0.210 |
| E    |      | 1.02  |      |       | 0.40  |       |
| F    | 3.56 | 3.68  | 3.81 | 0.140 | 0.145 | 0.150 |
| G    |      | 13.51 |      |       | 0.532 |       |
| H    |      | 5.26  |      |       | 0.207 |       |
| I    |      | 0.76  |      |       | 0.030 |       |
| J    |      | 3.05  |      |       | 0.120 |       |
| K    |      | 2.54  |      |       | 0.100 |       |
| L    | 15.2 |       | 16.5 | 0.598 |       | 0.650 |
| M    |      | 2.29  |      |       | 0.090 |       |
| N    |      |       | 0.71 |       |       | 0.028 |
| R    |      | 1.65  |      |       | 0.065 |       |

## 9 Ordering information

**Table 8. Order codes**

| Die          | FLAT-16P         | SMD.5           | TO-257           | Terminal finish | VOUT  | Quantity level    |
|--------------|------------------|-----------------|------------------|-----------------|-------|-------------------|
|              | RHFL4913KP25-01V | RHFL4913S25-03V | RHFL4913ESY2505V | Gold            | 2.5 V | QML-V             |
|              | RHFL4913KP25-02V | RHFL4913S25-04V | RHFL4913ESY2506V | Solder          | 2.5 V | QML-V             |
|              | RHFL4913KP251    | RHFL4913S251    | RHFL4913ESY251   | Gold            | 2.5 V | EM1               |
|              | RHFL4913KP252    | RHFL4913S252    | RHFL4913ESY252   | Gold            | 2.5 V | EM1=EM 2+48h B.I. |
| L491325DIE2V |                  | Flight model    |                  | NA              | 2.5 V | QML-V             |
| L491325DIE2S |                  |                 |                  | NA              | 2.5 V | EM1               |
|              | RHFL4913KP33-01V | RHFL4913S33-03V | RHFL4913ESY3305V | Gold            | 3.3 V | QML-V             |
|              | RHFL4913KP33-02V | RHFL4913S33-04V | RHFL4913ESY3306V | Solder          | 3.3 V | QML-V             |
|              | RHFL4913KP331    | RHFL4913S331    | RHFL4913ESY331   | Gold            | 3.3 V | EM1               |
|              | RHFL4913KP332    | RHFL4913S332    | RHFL4913ESY332   | Gold            | 3.3 V | EM1=EM 2+48h B.I. |
| L491333DIE2V |                  |                 |                  | NA              | 3.3 V | QML-V             |
| L491333DIE2S |                  |                 |                  | NA              | 3.3 V | EM1               |
|              | RHFL4913KP50-01V | RHFL4913S50-03V | RHFL4913ESY5005V | Gold            | 5.0 V | QML-V             |
|              | RHFL4913KP50-02V | RHFL4913S50-04V | RHFL4913ESY5006V | Solder          | 5.0 V | QML-V             |
|              | RHFL4913KP501    | RHFL4913S501    | RHFL4913ESY501   | Gold            | 5.0 V | EM1               |
|              | RHFL4913KP502    | RHFL4913S502    | RHFL4913ESY502   | Gold            | 5.0 V | EM1=EM 2+48h B.I. |
| L491350DIE2V |                  |                 |                  | NA              | 5.0 V | QML-V             |
| L491350DIE2S |                  |                 |                  | NA              | 5.0 V | EM1               |

**Table 9. ST part number-SMD equivalent part number**

| ST part number   | SMD part number |
|------------------|-----------------|
| RHFL4913KP25-01V | 5962F0253401VXC |
| RHFL4913KP25-02V | 5962F0253401VXA |
| RHFL4913KP33-01V | 5962F0253501VXC |
| RHFL4913KP33-02V | 5962F0253501VXA |
| RHFL4913KP50-01V | 5962F0253601VXC |
| RHFL4913KP50-02V | 5962F0253601VXA |
| RHFL4913S25-03V  | 5962F0253402VYC |
| RHFL4913S25-04V  | 5962F0253402VYA |
| RHFL4913S33-03V  | 5962F0253502VYC |
| RHFL4913S33-04V  | 5962F0253502VYA |
| RHFL4913S50-03V  | 5962F0253602VYC |
| RHFL4913S50-04V  | 5962F0253602VYA |
| RHFL4913ESY2505V | 5962F0253402VZC |
| RHFL4913ESY2506V | 5962F0253402VZA |
| RHFL4913ESY3305V | 5962F0253502VZC |
| RHFL4913ESY3306V | 5962F0253502VZA |

| ST part number   | SMD part number |
|------------------|-----------------|
| RHFL4913ESY5005V | 5962F0253602VZC |
| RHFL4913ESY5006V | 5962F0253602VZA |
| L491325DIE2V     | 5962F0253402V9A |
| L491333DIE2V     | 5962F0253502V9A |
| L491350DIE2V     | 5962F0253602V9A |

**Table 10. Environmental characteristics**

| Parameters                     | Conditions  | Value | Unit     |
|--------------------------------|---|-------|----------|
| Output voltage thermal drift   | -55 °C to +125 °C                                   | 40    | ppm/°C   |
| Output voltage radiation drift | From 0 krad to 300 krad at 0.55 rad/s               | 8     | ppm/krad |
| Output voltage radiation drift | From 0 krad to 300 krad, Mil Std 883E Method 1019.6 | 6     | ppm/krad |

## Revision history

**Table 11. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 05-Oct-2004 | 4        | Mistake in pin description SMD.5 on table 3.  |
| 28-Oct-2004 | 5        | New order codes added - tables 4 and 5.   |
| 27-May-2005 | 6        | The features, tables 4, 5 and the figures 1, 2 updated.   |
| 08-Jun-2005 | 7        | Modified: PD on table 1, the RthJC for TO-257 on table 2 and the tables 6 and 7, added DIE information  |
| 26-Aug-2008 | 8        | Added new output 1.5 V, modified: Table 4 on page 6, Table 5 on page 16 and Table 6 on page 17.   |
| 02-Oct-2008 | 9        | Modified: Features on page 1, Application information on page 10 and SMD.5 mechanical data on page 14.  |
| 20-Nov-2009 | 10       | Modified: Table 5 on page 16.   |
| 19-Oct-2010 | 11       | Modified: Section 7 on page 11.   |
| 08-Feb-2011 | 12       | Added: note Table 1 on page 4.  |
| 07-Dec-2011 | 13       | Removed the note under Table 1 on page 4 and added footnotes 1 and 2.   |
| 02-May-2019 | 14       | Updated the description.  |
| 10-Feb-2021 | 15       | Updated cover image, <a href="#">Section Features</a> , <a href="#">Section Description</a> , <a href="#">Section 7 Notes about FLAT-16P package</a> , <a href="#">Section 8.2 SMD.5 package information</a> .<br>Minor text changes. |



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