Voltage Regulator

IFX1117

Data Sheet

RoHS

Features

- Output voltage 3.3 V or adjustable
- 1.0 A output current
- Low drop voltage < 1.2 V @ 800 mA
- Short circuit protected
- Overtemperature protected
- Operating range up to 15 V
- Industrial type
- Green Product (RoHS compliant)

For automotive and transportation applications, please refer to the Infineon TLE and TLF voltage regulator series.

Functional Description

The IFX1117 is a monolithic integrated fixed NPN type voltage regulator that can supply loads up to 1.0 A. The device is housed in the small surface mounted SOT223 package. The IC is equipped with additional protection against overload, short circuit and over-temperature.

The IFX1117ME V33 supplies a regulated output voltage of 3.3 V (±2%). The IFX1117ME V supplies an output voltage with ±2% precision adjustable via an external voltage divider. The input voltage for the IFX1117ME V33 ranges from 4.5 V (= V_Q+V_{DR}) to 15 V for a load current of 800 mA, for the maximum load current of 1.0 A a minimum input voltage of 4.7 V is required. The drop voltage V_{DR} ranges from 1.1 V to 1.4 V depending on the load current level.

The device operates in the temperature range of T_j = 0 to 125 °C.

Type	Package	Marking
IFX1117ME V33	PG-SOT223	111733
IFX1117ME V	PG-SOT223	1117V

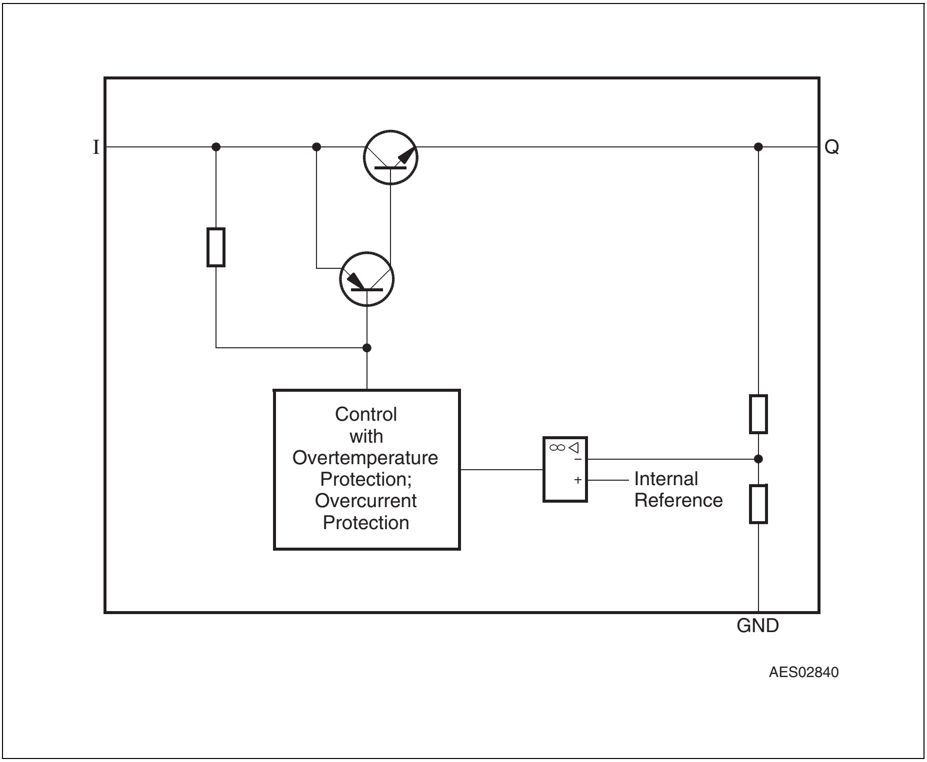


Figure 1 **Block Diagram for Fixed Output Voltage IFX1117ME V33**

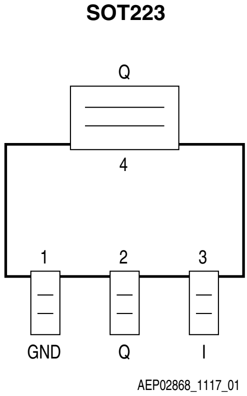


Figure 2 Pin Configuration IFX1117ME V33 (top view)

Table 1 Pin Definitions and Functions IFX1117ME V33

Pin No.	Symbol	Function
1	GND	**Ground**
2	Q	**Output;** Connect output pin to GND via a capacitor $C_Q \geq 10\ \mu F$ with ESR $\leq 20\ \Omega$ (see also graph "Region of Stability")
3	I	**Input**
4 (TAB)	Q	**Output;** Connect to pin 2 and heatsink area on PCB

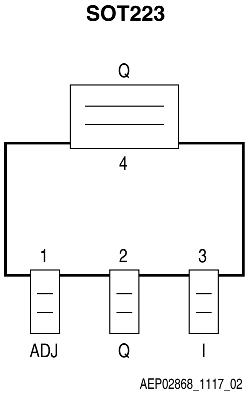


Figure 3 Pin Configuration IFX1117ME V (top view)

Table 2 Pin Definitions and Functions IFX1117ME V

Pin No.	Symbol	Function
1	ADJ	**Adjust;** defines output voltage level by external voltage divider between Q, ADJ and GND.
2	Q	**Output;** Connect output pin to GND via a capacitor $C_Q \geq 10\ \mu F$ with ESR $\leq 20\ \Omega$ (see also graph "Region of Stability").
3	I	**Input**
4 (TAB)	Q	**Output;** Connect to pin 2 and heatsink area on PCB

Table 3 Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Test Condition
		Min.	Max.		
Input - Output Voltage Difference (variable device only)					
Voltage	V_I - V_Q	-0.3	20	V	–
Input Voltage (fixed voltage version only)					
Voltage	V_I	-0.3	20	V	–
Output					
Voltage	V_Q	-0.3	20	V	–
Current	I_Q	–	–	–	Internally limited
ESD Rating					
Electrostatic discharge voltage	V_{ESD}	-2	2	kV	Human Body Model
Temperature					
Storage temperature	T_{stg}	-50	150	°C	–
Junction temperature	T_j	-40	150	°C	–

Note: Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 4 Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		Min.	Max.		
Input Voltage	V_I	$V_Q + V_{DR}$	15	V	–
Junction temperature	T_j	0	125	°C	–
Table 5 Thermal Resistance					
Junction ambient	R_{thja}	–	164	K/W	PG-SOT223, footprint only.
		–	81	K/W	PG-SOT223, 300 mm² heat sink area
Junction case	R_{thjc}	–	4	K/W	–

Note: In the operating range, the functions given in the circuit description are fulfilled.

Characteristics 3.3 V Fixed Output Voltage Device IFX1117ME V33
0 °C < T_j < 125 °C; V_I = 5 V, I_Q = 10 mA; unless otherwise specified.

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Output voltage	V_Q	3.235	3.300	3.365	V	0 mA ≤ I_Q ≤ 800 mA 4.7 V ≤ V_I ≤ 10 V
Output voltage	V_Q	–	3.300	–	V	0 mA ≤ I_Q ≤ 1000 mA; 4.7 V ≤ V_I ≤ 15V
Line regulation	ΔV_Q	–	1	6	mV	4.7 V ≤ V_I ≤ 15V
Load regulation	ΔV_Q	–	1	10	mV	0 mA ≤ I_Q ≤ 800 mA;[1]
		–	2	–	mV	0 mA ≤ I_Q ≤ 1.0 A[1]
Drop voltage	V_{DR}	–	1.00	1.10	V	I_Q = 100 mA[2]
Drop voltage	V_{DR}	–	1.05	1.15	V	I_Q = 500 mA[2]
Drop voltage	V_{DR}	–	1.10	1.20	V	I_Q = 800 mA[2]
Drop voltage	V_{DR}	–	1.30	1.40	V	I_Q = 1.0 A[2]
Current consumption; $I_q = I_I - I_Q$	I_q	–	5	10	mA	I_Q = 10 mA
Temperature stability	ΔV_Q	–	16.5	–	mV	[3]
Long Term Stability	–	–	0.3	–	%	[3]
Current limit	I_{Qmax}	1100	–	2250	mA	V_Q = 0.5 V
RMS Output Noise	–	–	30	–	ppm	ppm of V_Q, T_j = 25 °C 10 Hz ≤ f ≤ 10 kHz[3]
Power Supply Ripple Rejection	$PSRR$	60	65	–	dB	f_r = 120 Hz, V_r = 1 V_{PP}[3]

1) Measured at constant junction temperature
2) Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V_I = 5.0 V.
3) Specified by design; not subject to production test.

Characteristics Adjustable Output Voltage Device IFX1117ME V
0 °C < T_j < 125 °C; V_I = 5 V, I_Q = 10 mA; unless otherwise specified.

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Reference voltage	V_Q	1.225	1.250	1.270	V	10 mA ≤ I_Q ≤ 800 mA; 1.4 V ≤ (V_I-V_Q) ≤ 10 V
Output voltage	V_Q	–	1.250	–	V	10 mA ≤ I_Q ≤ 1000 mA; 2.65 V ≤ V_I ≤ 15 V
Line regulation	ΔV_Q	–	0.035	0.2	%[1]	1.5 V ≤(V_I-V_Q)≤ 13.75 V
Load regulation	ΔV_Q	–	0.2	0.4	%[1]	10 mA ≤ I_Q ≤ 800 mA;[2]
		–	0.25	–	%[1]	10 mA ≤ I_Q ≤ 1.0 A [2]
Drop voltage	V_{DR}	–	1.00	1.10	V	I_Q = 100 mA [3]
Drop voltage	V_{DR}	–	1.05	1.15	V	I_Q = 500 mA [3]
Drop voltage	V_{DR}	–	1.10	1.20	V	I_Q = 800 mA [3]
Drop voltage	V_{DR}	–	1.30	1.40	V	I_Q = 1.0 A [3]
Minimum Load Current [4]	I_q	–	1.7	5.0	mA	V_I = 15 V
Adjust Current	I_{ADJ}	–	100	120	µA	I_Q = 10 mA
Adjust Current Change	ΔI_{ADJ}	–	2	5	µA	1.4 V ≤(V_I-V_Q)≤ 13.6 V; 10 mA ≤ I_Q ≤ 800 mA
Temperature stability	ΔV_Q	–	0.5	–	%[1]	[5]
Long Term Stability	–	–	0.3	–	%[1]	[5]
Current limit	I_{Qmax}	1100	–	2250	mA	V_Q = 0.5 V
RMS Output Noise	–	–	30	–	ppm	ppm of V_Q, T_j = 25 °C 10 Hz ≤ f ≤ 10 kHz [5]
Power Supply Ripple Rejection	$PSRR$	65	70	–	dB	f_r = 120 Hz, V_r = 1 V_{PP} [5]

1) Related to V_Q
2) Measured at constant junction temperature
3) Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V_I = 5.0 V.
4) Minimum load current required to maintain regulation
5) Specified by design; not subject to production test.

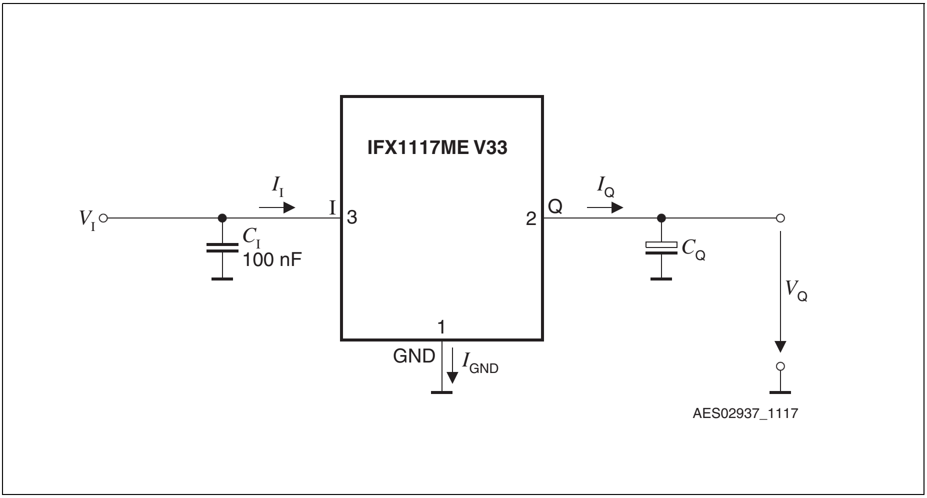


Figure 4 Measuring Circuit

Application Information

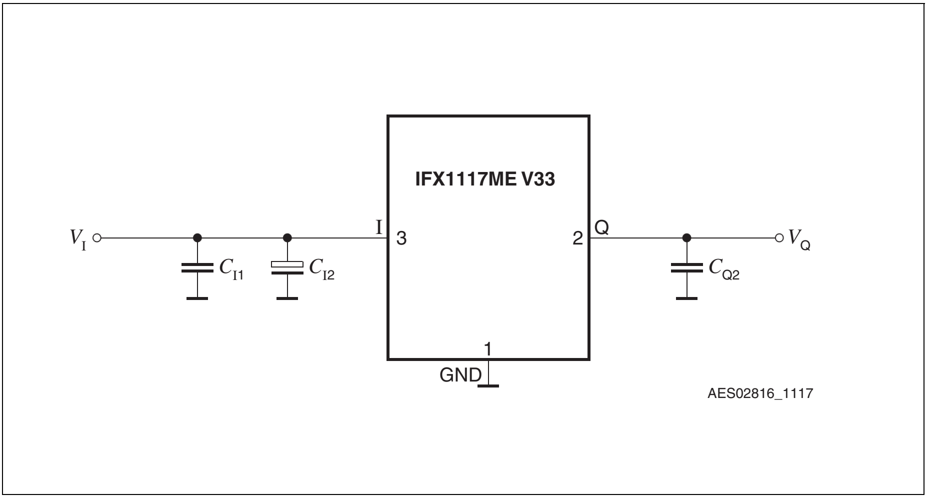


Figure 5 Typical Application Circuit IFX1117ME V33

Output

The IFX1117 requires a 10 µF output capacitor with ESR ≤ 20 Ω for the stability of the regulation loop. The use of a tantalum output capacitor is recommended.

For the adjustable device IFX1117ME V the output voltage level can be defined by a voltage divider between Q, ADJ and GND.

The output voltage calculates:

$$V_Q = V_{REF} \times \left(1 + \frac{R_2}{R_1}\right) + I_{ADJ} \times R_2 \quad (1)$$

At the input of the regulator a capacitor is recommended to compensate line influences. As a minimum a 100 nF ceramic input capacitor should be used. If the regulator is used in an environment with long input lines an input capacitance of 10 µF is suggested.

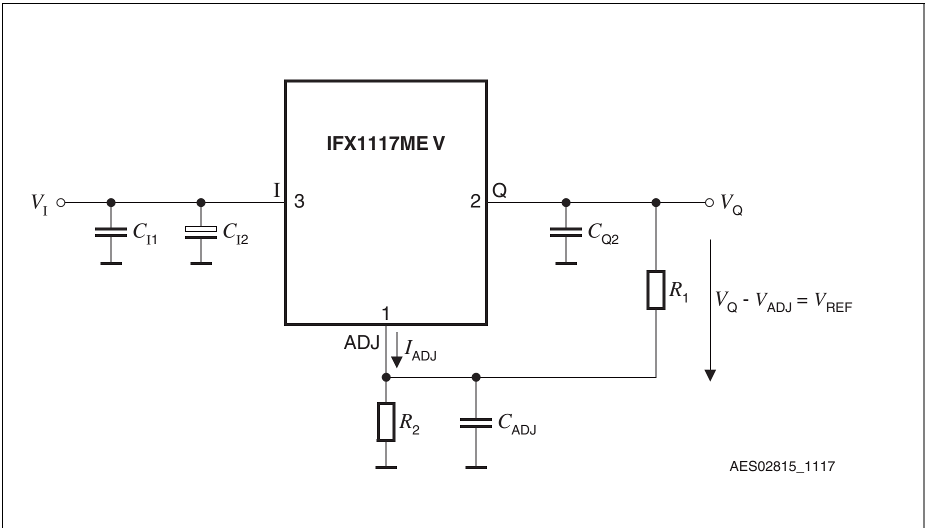
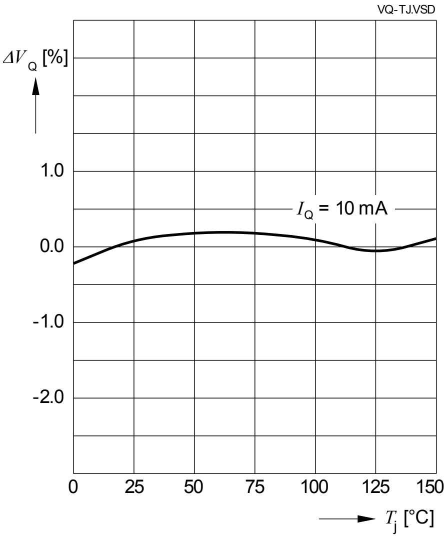


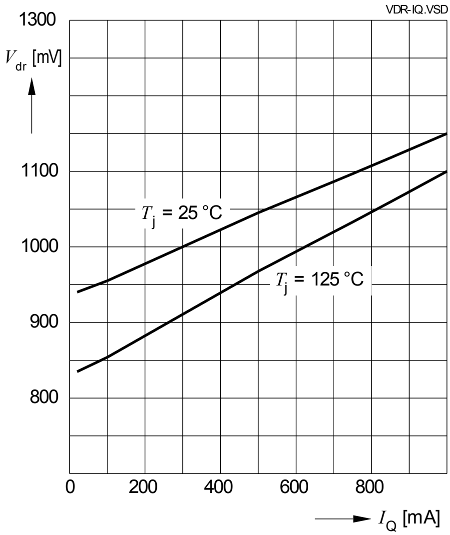
Figure 6 Typical Application Circuit IFX1117ME V

Typical Performance Characteristics

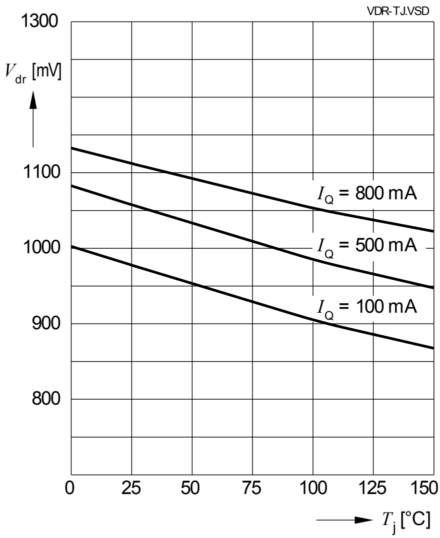
Output Voltage V_Q versus Junction Temperature T_j



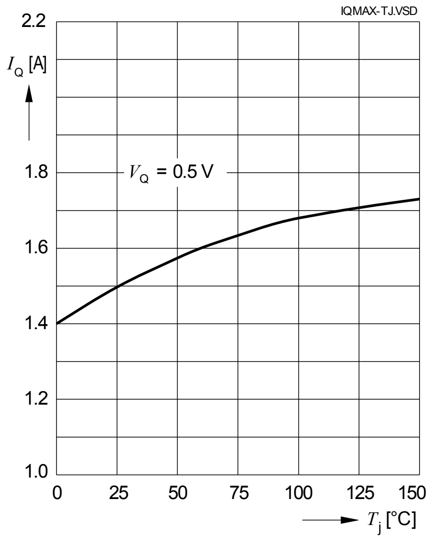
Dropout Voltage V_{dr} versus Output Current I_Q



Dropout Voltage V_{dr} versus Junction Temperature T_j

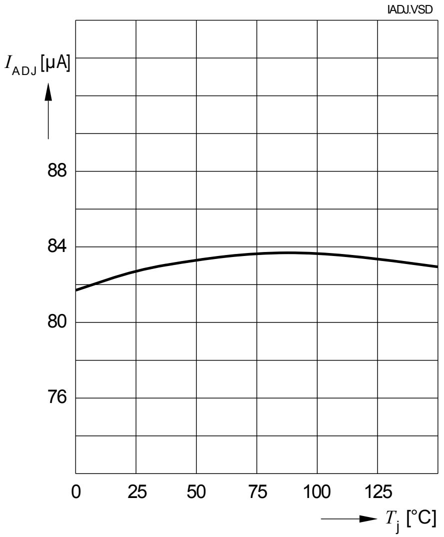


Maximum Output Current I_Q versus Junction Temperature T_j

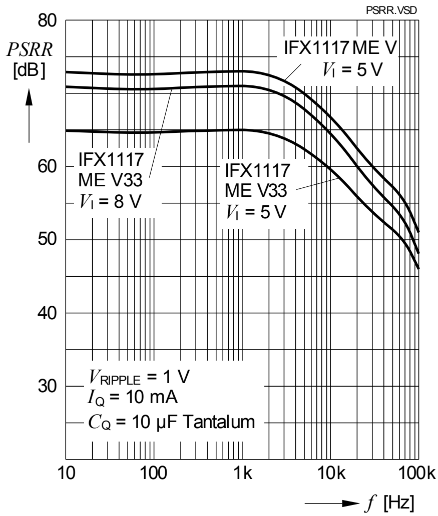


Typical Performance Characteristics

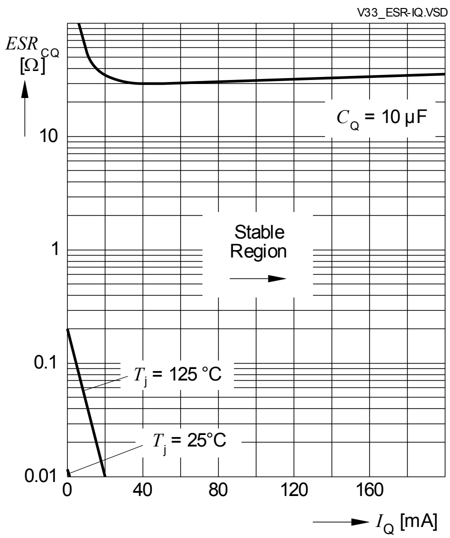
Adjust Pin Current I_{ADJ} versus Junction Temperature T_j



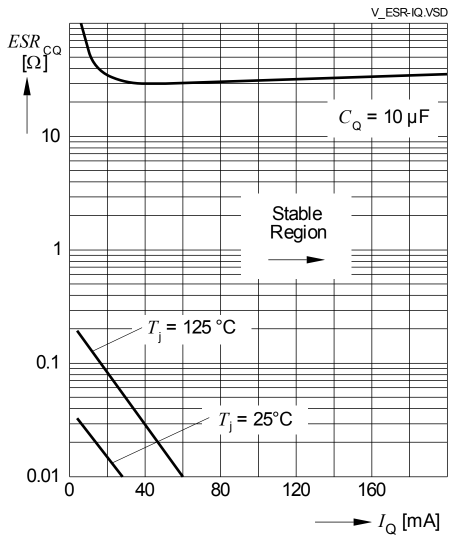
Power Supply Ripple Rejection $PSRR$ versus Frequency f



Region of Stability Version ME V33

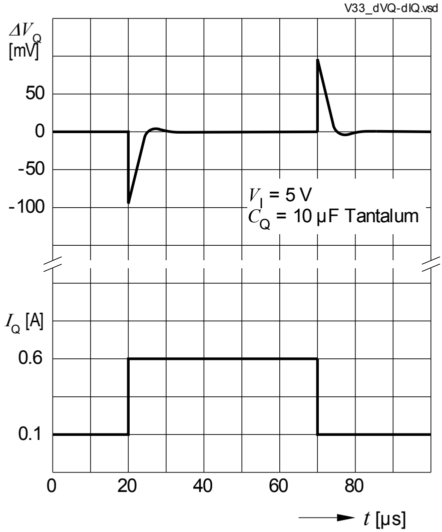


Region of Stability Version ME V

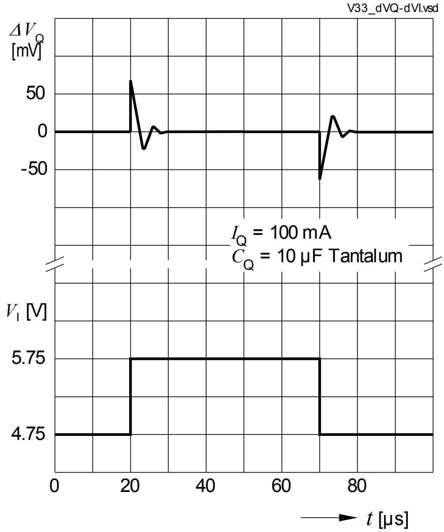


Typical Performance Characteristics

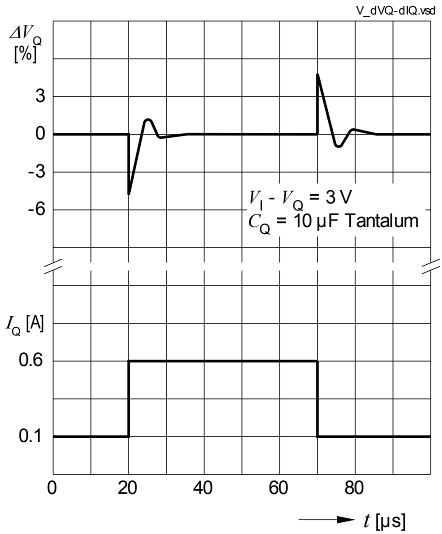
Load Transient Response Version ME V33



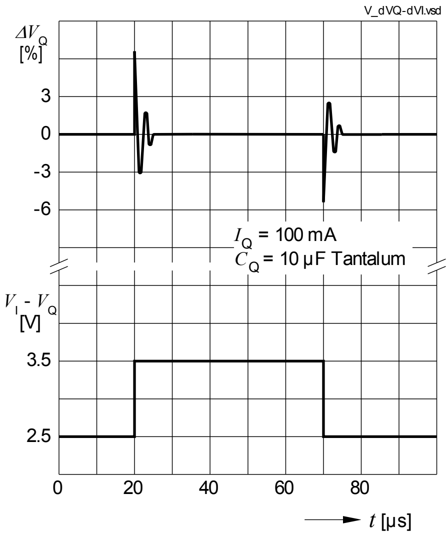
Line Transient Response Version ME V33



Load Transient Response Version ME V



Line Transient Response Version ME V



Package Outline

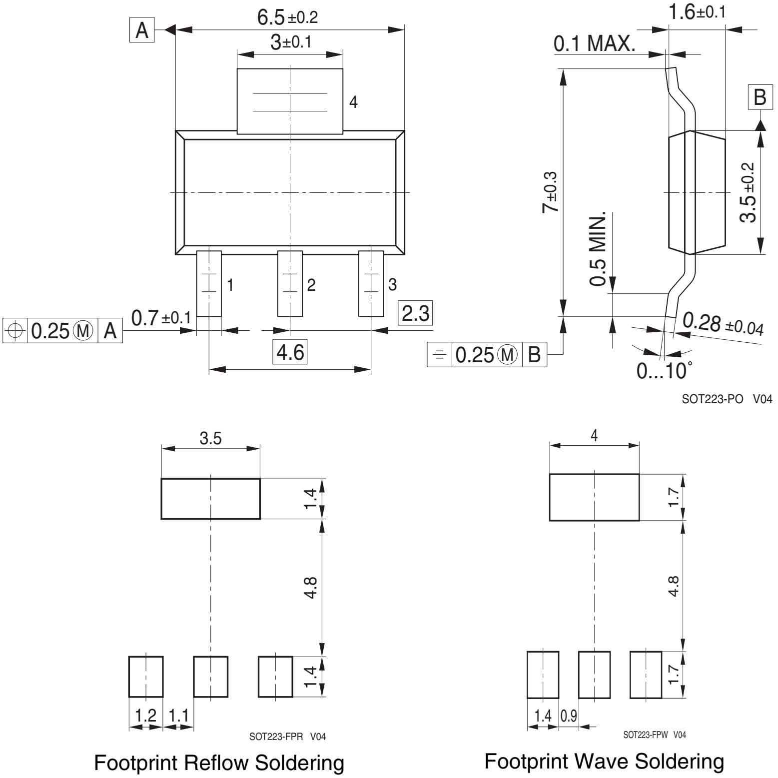


Figure 7 Outline and footprint PG-SOT223

Green Product (RoHS-Compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

You can find all of our packages, sorts of packing and others in our Infineon Internet Page "Products": **http://www.infineon.com/products**.

SMD = Surface Mounted Device

Dimensions in mm

Version	Date	Changes
Rev. 1.0	2011-02-24	Data Sheet

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