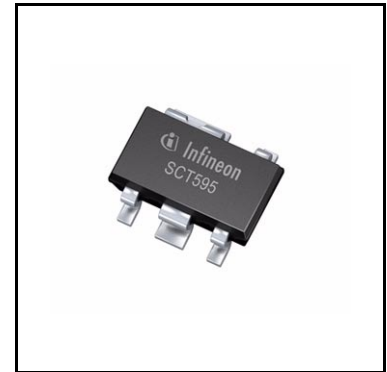# IFX20001

Low dropout voltage regulator

RoHS

Features

- Two output voltage versions: 3.3 V, 5.0 V
- Low drop voltage ≤ 300 mV over the full temperature range
- Output current: 30 mA
- Inhibit function
- Low quiescent current
- Input voltage up to 45 V
- Wide temperature range: T_j = -40°C to +125°C
- Output protected against short circuit
- Overtemperature protection
- Reverse polarity protection
- Very small and thermally enhanced package
- Green Product (RoHS compliant)

Potential applications

- Manufacturing automation
- Appliances
- Network routers

The IFX20001 is not qualified and manufactured according to the requirements of Infineon Technologies with regards to automotive and/or transportation applications. For automotive applications please refer to the Infineon TLx (TLE, TLS, TLF, ...) voltage regulator products.

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC.

Description

The IFX20001 is a monolithic integrated low drop voltage regulator in a very small SMD package PG-SCT595-5. It is designed to supply various loads (e.g. microcontrollers, sensors, or as stand-by supply, etc.) under severe conditions. Therefore the device is equipped with additional protection functions against overload, short circuit and reverse polarity. In case of an overtemperature condition the regulator is automatically turned off by the integrated thermal protection circuit.

Input voltages up to 40 V are regulated to $V_{Q,nom}$ = 3.3 V (V33 version) or 5.0 V (V50 version). The output is able to drive a load of 30 mA while it regulates the output voltage within a 4% accuracy. To save energy the device can be switched to stand-by mode via an inhibit input which causes the current consumption to drop below 5 µA.

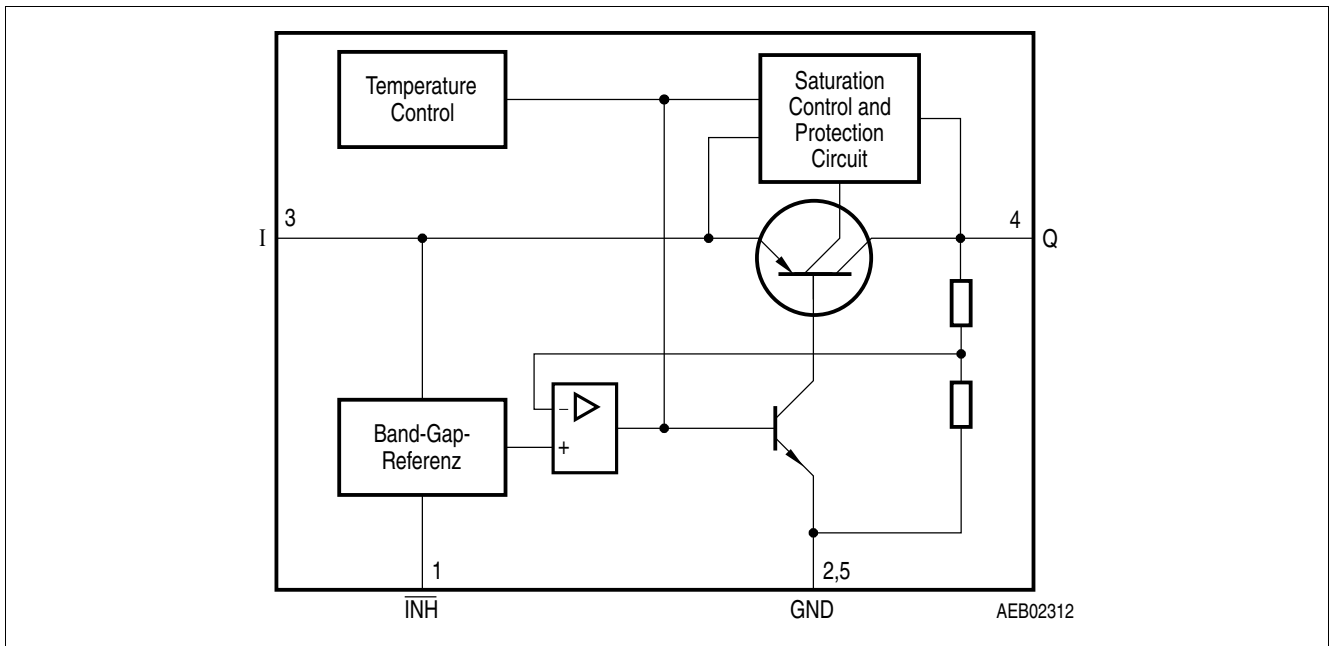| Type	Package	Marking
IFX20001MBV33	PG-SCT595-5	V3
IFX20001MBV50	PG-SCT595-5	V5

Table of contents

1 Block diagram

Figure 1   Block diagram

2 Pin configuration

2.1 Pin assignment

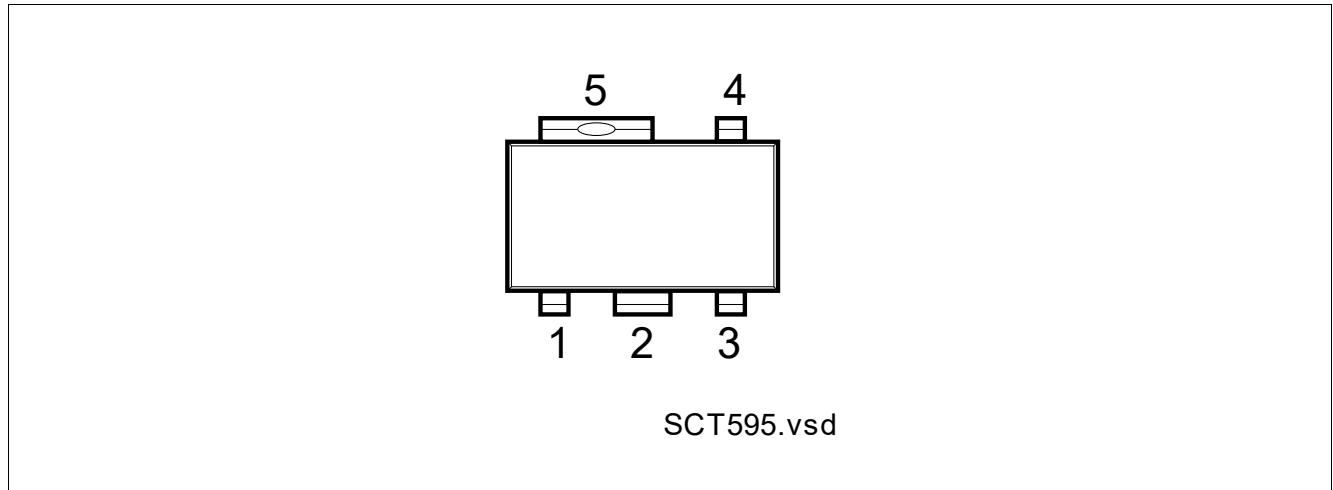**Figure 2** Pin configuration (top view)

2.2 Pin definitions and functions

Table 1 Pin definitions and functions fixed output voltage versions

Pin	Symbol	Function
1	$\overline{\text{INH}}$	**Inhibit input** High level to turn on the IC.
2	GND	**Ground** Connected to pin 5.
3	I	**Input voltage**
4	Q	**Output voltage** Must be blocked with a ceramic capacitor $C_Q \geq 3.3\ \mu\text{F}$.[1)2)]
5	GND	**Ground** Connected to pin 2.

1) Output capacitor requirements for IFX20001MBV33: $C_Q \geq 3.3\ \mu\text{F}$, ESR = 2.5 Ω to 6 Ω.

2) Output capacitor requirements for IFX20001MBV50: $C_Q \geq 3.3\ \mu\text{F}$, ESR = 2.5 Ω to 8 Ω.

3 General product characteristics

3.1 Absolute maximum ratings

Table 2 Absolute maximum ratings[1]

T_j = -40°C to 150°C; all voltages with respect to ground, positive current flowing into pin
(unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Input I							
Voltage	V_I	-42	–	45	V	–	P_3.1.1
Current	I_I	–	–	–		[2]	
Output Q							
Voltage	V_Q	-6	–	30	V	–	P_3.1.2
Current	I_I	–	–	–		[2]	
Inhibit							
Voltage	$V_{\overline{INH}}$	-42	–	45	V	–	P_3.1.3
Current	$I_{\overline{INH}}$	-500	–	[2]	µA	–	P_3.1.4
		-5	–	5	mA	-0.3 V ≤ V_I ≤ 45 V; t_p < 1 ms	P_3.1.5
Temperatures							
Junction temperature	T_j	-40	–	150	°C	–	P_3.1.6
Storage temperature	T_{stg}	-50	–	150	°C	–	P_3.1.7

1) Not subject to production test, specified by design.
2) Internally limited.

Notes

1. *Stresses above the ones listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*
2. *Integrated protection functions are designed to prevent IC destruction under fault conditions described in the data sheet. Fault conditions are considered as "outside" normal operating range. Protection functions are not designed for continuous repetitive operation.*

3.2 Functional range

Table 3 Functional range

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Input voltage	V_I	4.0	–	45	V	IFX20001MBV33	P_3.2.1
		5.5	–	45	V	IFX20001MBV50	P_3.2.2
Inhibit voltage	$V_{\overline{INH}}$	-0.3	–	40	V	–	P_3.2.3
Junction temperature	T_j	-40	–	125	°C	–	P_3.2.4

Note: Within the functional or operating range, the IC operates as described in the circuit description. The electrical characteristics are specified within the conditions given in the electrical characteristics table.

3.3 Thermal resistance

*Note: This thermal data was generated in accordance with JEDEC JESD51 standards. For more information, go to **www.jedec.org**.*

Table 4 Thermal resistance

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Junction to ambient	R_{thJA}	–	81	–	K/W	2s2p board[1]	P_3.3.1
		–	217	–	K/W	Footprint only[2]	P_3.3.2
		–	117	–	K/W	300 mm² PCB heatsink area[2]	P_3.3.3
		–	103	–	K/W	600 mm² PCB heatsink area[2]	P_3.3.4
Junction to soldering point	R_{thJSP}	–	30	–	K/W	Pins 2, 5 fixed to T_A	P_3.3.5

1) Specified R_{thJA} value is according to Jedec JESD51-2,-5,-7 at natural convection on FR4 2s2p board; The product (chip+package) was simulated on a 76.2 × 114.3 × 1.5 mm³ board with 2 inner copper layers (2 × 70 μm Cu, 2 × 35 μm Cu). Where applicable a thermal via array under the exposed pad contacted the first inner copper layer.

2) Package mounted on PCB FR4; 80 × 80 × 1.5 mm³, 35 μm Cu, 5 μm Sn; horizontal position; zero airflow. Not subject to production test; specified by design.

4 Electrical characteristics

4.1 Electrical characteristics voltage regulator

Table 5   Electrical characteristics voltage regulator

V_I = 13.5 V; $V_{\overline{INH}}$ > 2.5 V; T_j = -40°C to +125°C; all voltages with respect to ground (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Output voltage IFX20001MBV33	V_Q	3.17	3.30	3.43	V	1 mA ≤ I_Q ≤ 30 mA V_I = 13.5 V	P_5.1.1
		3.17	3.30	3.43	V	I_Q = 10 mA; 4.3 V ≤ V_I ≤ 40 V	P_5.1.2
Output voltage IFX20001MBV50	V_Q	4.80	5.00	5.20	V	1 mA ≤ I_Q ≤ 30 mA V_I = 13.5 V	P_5.1.18
		4.80	5.00	5.20	V	I_Q = 10 mA; 6 V ≤ V_I ≤ 40 V	P_5.1.19
Output current limitation	I_Q	30	–	–	mA	1)	P_5.1.3
Dropout voltage 1)	V_{dr}	–	250	300	mV	I_Q = 20 mA	P_5.1.4
Output capacitor	C_Q	3.3	–	–	µF	IFX20001MBV33: 2.5 Ω ≤ ESR ≤ 6 Ω at 10 kHz	P_5.1.5
		3.3	–	–	µF	IFX20001MBV50: 2.5 Ω ≤ ESR ≤ 8 Ω at 10 kHz	P_5.1.20
Current consumption $I_q = I_I – I_Q$	I_q	–	2	4.5	mA	I_Q < 30 mA	P_5.1.6
		–	110	170	µA	I_Q < 1 mA; T_j < 85°C	P_5.1.7
Quiescent current (stand-by) $I_q = I_I – I_Q$	I_q	–	–	1	µA	$V_{\overline{INH}}$ = 0.4 V; T_j < 85°C	P_5.1.8
		–	–	5	µA	$V_{\overline{INH}}$ = 0.4 V	P_5.1.9
Load regulation	ΔV_Q	–	10	20	mV	1 mA < I_Q < 25 mA; T_j = 25°C;	P_5.1.10
Line regulation	ΔV_Q	–	5	20	mV	V_I = ($V_{Q,nom}$ + 0.5 V) to 36 V; I_Q = 5 mA; T_j = 25°C	P_5.1.12
Power supply ripple rejection	PSRR	–	60	–	dB	f_r = 100 Hz; V_r = 0.5 V_{pp}	P_5.1.13
Logic Inhibit input							
Inhibit, turn-on voltage	$V_{\overline{INH},high}$	–	–	2.2	V	V_Q > 0.95 × $V_{Q,nom}$	P_5.1.14
Inhibit, turn-off voltage	$V_{\overline{INH}, low}$	0.4	–	–	V	V_Q < 0.1 V	P_5.1.15
H-input current	$V_{\overline{INH},high}$	–	8	12	µA	$V_{\overline{INH}}$ = 5 V	P_5.1.16
L-input current	$V_{\overline{INH}, low}$	-2	–	2	µA	$V_{\overline{INH}}$ = 0 V	P_5.1.17

1)   Measured when the output voltage V_Q has dropped 100 mV from the nominal value.

4.2   Typical performance characteristics voltage regulator

Output voltage V_Q vs.
input voltage V_I

AED03349.VSD

V_{INH} = 5 V
R_L = 1 kΩ

GV50

GV33

V_I
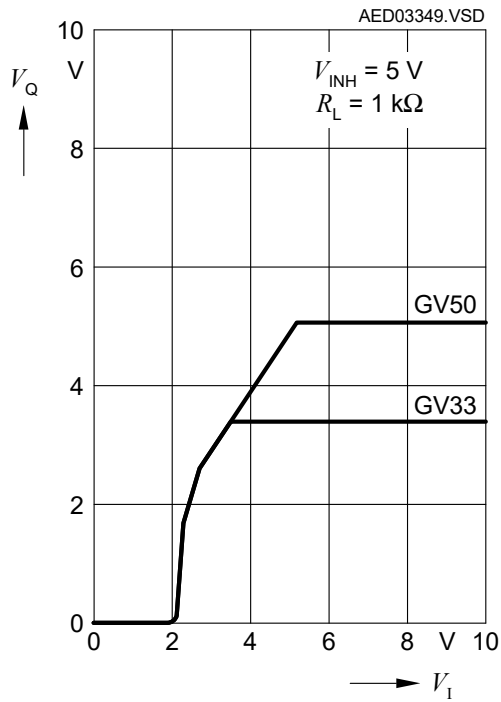
Current consumption I_q vs.
input voltage V_I

AED03347.VSD

V_{INH} = 5 V

R_L = 1 kΩ

R_L = 5 kΩ

V_I
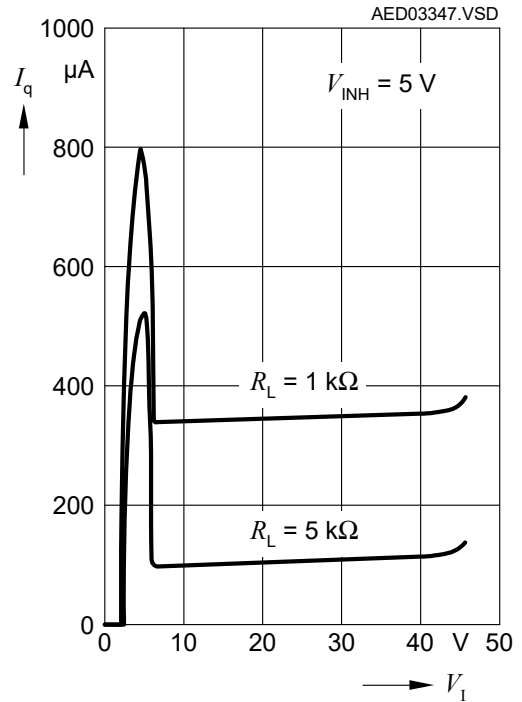
5 Application information

Note: *The following information is given as a hint for the implementation of the device only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.*
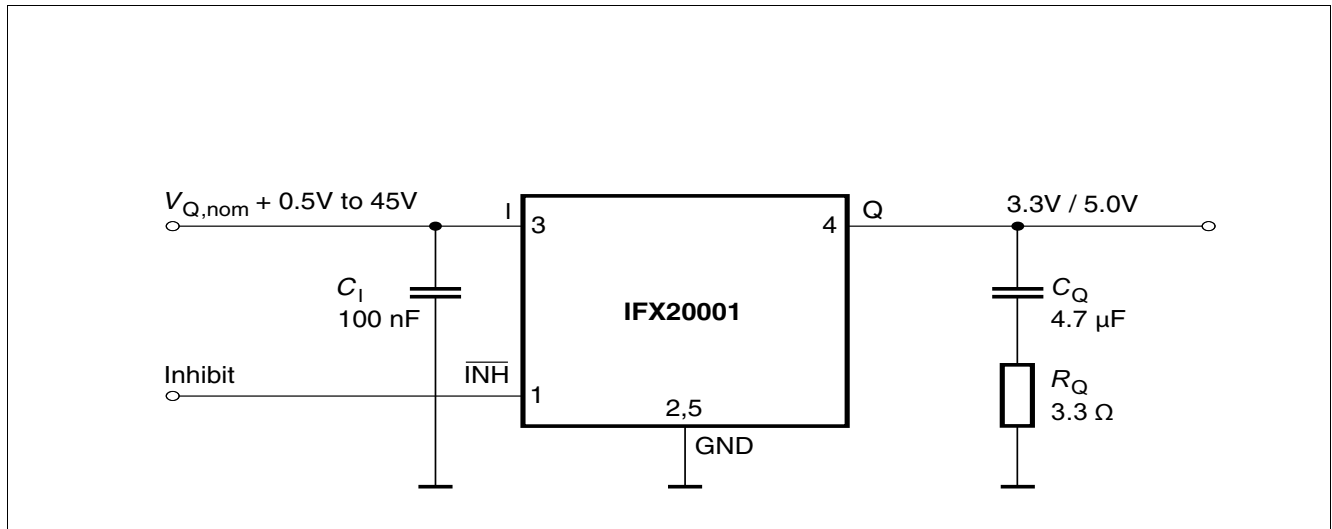
Figure 3 **Application diagram**

The output voltage of the IFX20001 is divided and compared to an internal reference of 2.5 V typical. A regulation loop controls the output to achieve a stabilized output voltage.

Figure 3 shows a typical application circuit. In order to maintain the stability of the control loop the IFX20001 output requires an output capacitor C_Q of at least 3.3 µF with a minimum required ESR of 2.5 Ω and a maximum allowed ESR of 6 Ω for the IFX20001MBV33 and 8 Ω for the IFX20001MBV50. It is recommended to use for C_Q a suitable tantalum capacitor or a multilayer ceramic capacitor with a sufficiently dimensioned series resistor in order to cover the required ESR range over the full operating temperature range of T_j = -40°C to +125°C.[1]

At the input of the regulator a capacitor is required for compensating line influences (100 nF ceramic capacitor recommended). A resistor of approximately 1 Ω in series with the input capacitor C_I can dampen oscillations that could occur due to the input line inductance and the input capacitor.

---

1) For usage of ceramic capacitors without applying an additional series resistor at the output please refer to the IFX20002 which is a corresponding voltage regulator series specially designed for the usage of low-ESR output capacitors (< 2 Ω).
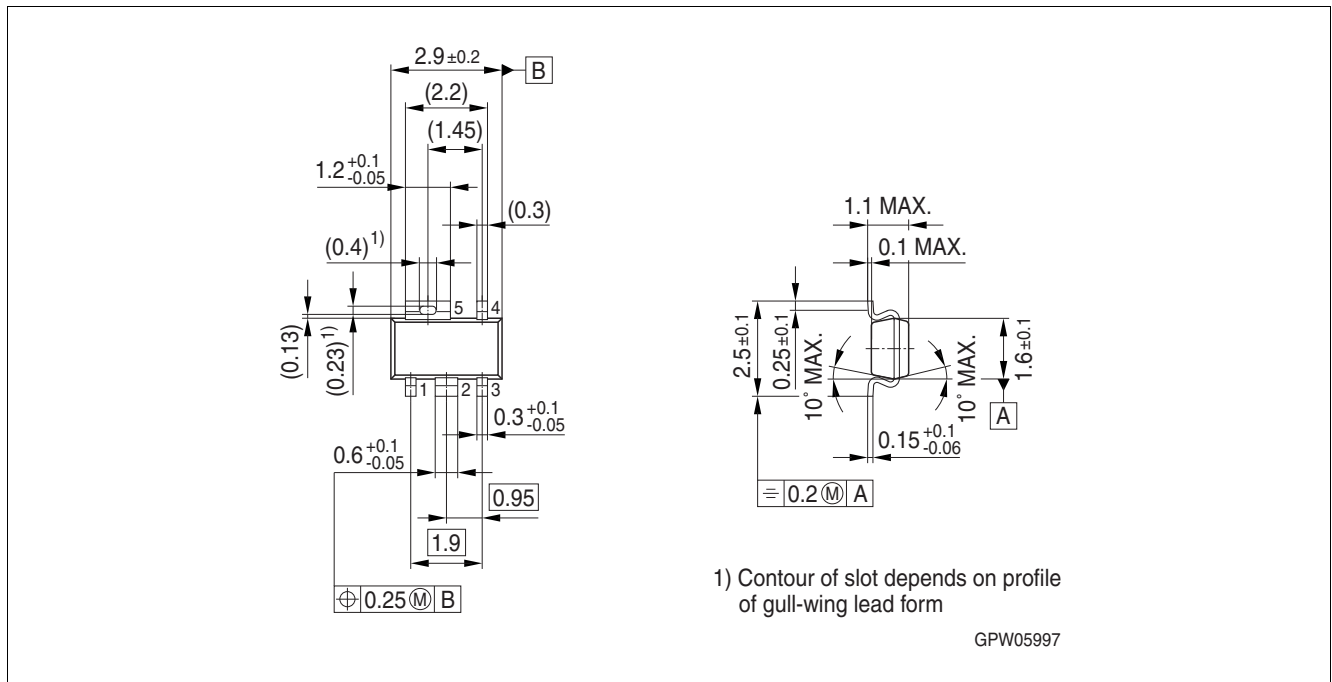
6 Package information

Figure 4   PG-SCT595-5[1]

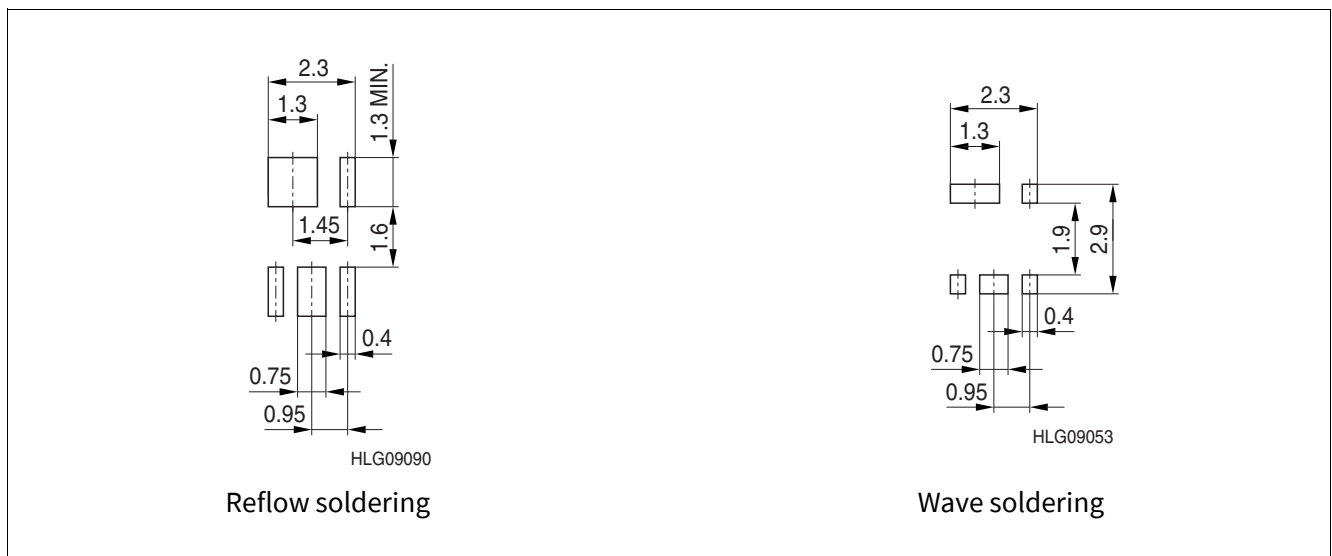

Reflow soldering

Wave soldering

Figure 5   Footprint PG-SCT595-5[1]

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).

Further information on packages

https://www.infineon.com/packages

---

1)   Dimensions in mm

7 Revision history

Revision	Date	Changes
1.20	2021-05-11	Updated layout and structure Editorial changes Added TOC
1.1	2013-01-08	Corrected ESR requirements for output capacitor (Chapter 3.2, Table 1 / Chapter 5.1, Table 2 / Chapter 6, "Application information" Added remarks/footnotes with respect to ESR (Chapter 6) Updated application diagram (Figure 3) Updated (improved) limits of parameters current consumption, line regulation and load regulation in electrical characteristics (Chapter 5.1, Table 2). Adapted test condition for current consumption Updated minimum limit for absolute maximum ratings of V_Q (Chapter 4.1) Further editorial changes
1.02	2010-05-20	Editorial change (Figure 3)
1.01	2009-09-10	Editorial changes: updated coverpage Overview page: inserted reference statement to TLE/TLF series
1.0	2009-04-28	Initial release

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

IMPORTANT NOTICE

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (**www.infineon.com**).

WARNINGS

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for LDO Voltage Regulators *category:*

Click to view products by Infineon *manufacturer:*

Other Similar products are found below :

AP7363-SP-13 L79M05TL-E PT7M8202B12TA5EX TCR3DF185,LM(CT MP2013GQ-33-Z 059985X NCP4687DH15T1G 701326R TCR2EN28,LF(S NCV8170AXV250T2G TCR2EN18,LF(S AP7315-25W5-7 IFX30081LDVGRNXUMA1 NCV47411PAAJR2G AP2113KTR-G1 AP2111H-1.2TRG1 ZLDO1117QK50TC AZ1117IH-1.8TRG1 TCR3DG12,LF MIC5514-3.3YMT-T5 MIC5512-1.2YMT-T5 MIC5317-2.8YM5-T5 SCD7912BTG NCP154MX180270TAG SCD33269T-5.0G NCV8170BMX330TCG NCV8170AMX120TCG NCP706ABMX300TAG NCP153MX330180TCG NCP114BMX075TCG MC33269T-3.5G CAT6243-ADJCMT5T TCR3DG33,LF AP2127N-1.0TRG1 TCR4DG35,LF LT1117CST-3.3 LT1117CST-5 TAR5S15U(TE85L,F) TAR5S18U(TE85L,F) TCR3UG19A,LF TCR4DG105,LF NCV8170AMX360TCG MIC94310-NYMT-T5 TLE4268GSXUMA2 NCV8186BMN175TAG NCP715SQ15T2G MIC5317-3.0YD5-T5 NCV563SQ18T1G MIC5317-2.8YD5-T5 NCP715MX30TBG