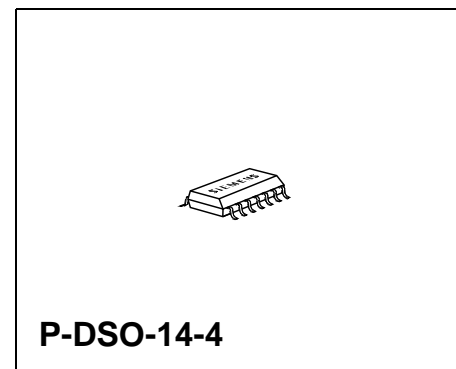
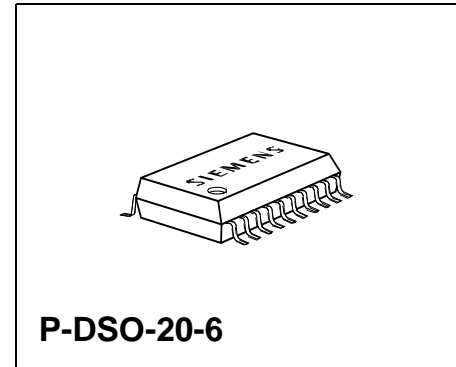


### Features

- Output voltage tolerance  $\leq \pm 2\%$
- Low-drop voltage
- Very low standby current consumption
- Overtemperature protection
- Reverse polarity protection
- Short-circuit proof
- Settable reset threshold
- Watchdog
- Wide temperature range
- Suitable for use in automotive electronics



Type	Ordering Code	Package
TLE 4263 G	Q67006-A9095	P-DSO-20-6 (SMD)
▼ TLE 4263 GM	Q67006-A9357	P-DSO-14-4 (SMD)

▼ New type

### Functional Description

TLE 4263 G is a 5-V low-drop voltage regulator in a P-DSO-20-6 SMD package. The maximum input voltage is 45 V. The maximum output current is more than 200 mA. The IC is short-circuit proof and incorporates temperature protection that disables the IC at overtemperature.

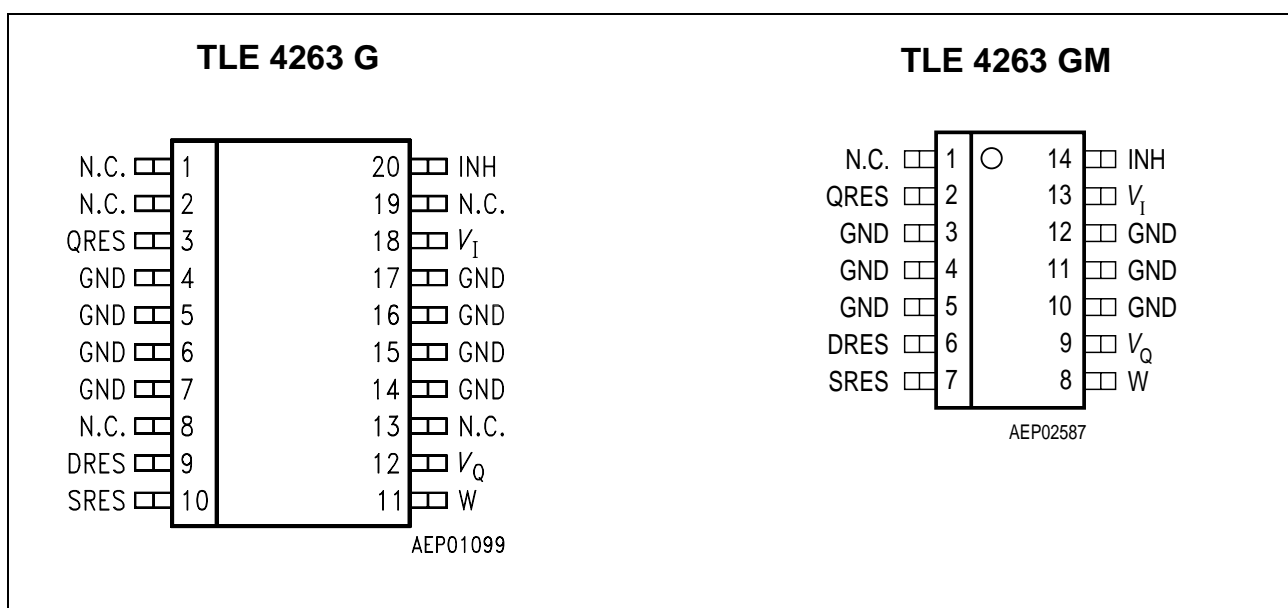
The IC regulates an input voltage  $V_i$  in the range of  $6\text{ V} < V_i < 45\text{ V}$  to  $V_{\text{Qrated}} = 5.0\text{ V}$ . A reset signal is generated for an output voltage of  $V_Q < 4.5\text{ V}$ . This voltage threshold can be decreased to 3.5 V by external connection. The reset delay can be set externally by a capacitor. The integrated watchdog logic controls the connected microcontroller. The IC can be switched off via the inhibit input, which causes the current consumption to drop from 800  $\mu\text{A}$  to  $< 50\text{ }\mu\text{A}$ .

## Dimensioning Information on External Components

The input capacitor  $C_1$  is necessary for compensating line influences. Using a resistor of approx.  $1 \Omega$  in series with  $C_1$ , the oscillating circuit consisting of input inductivity and input capacitance can be damped. The output capacitor is necessary for the stability of the regulating circuit. Stability is guaranteed at values  $\geq 22 \mu\text{F}$  and an ESR of  $\leq 3 \Omega$  within the operating temperature range. For small tolerances of the reset delay the spread of the capacitance of the delay capacitor and its temperature coefficient should be noted.

## Pin Configuration

(top view)



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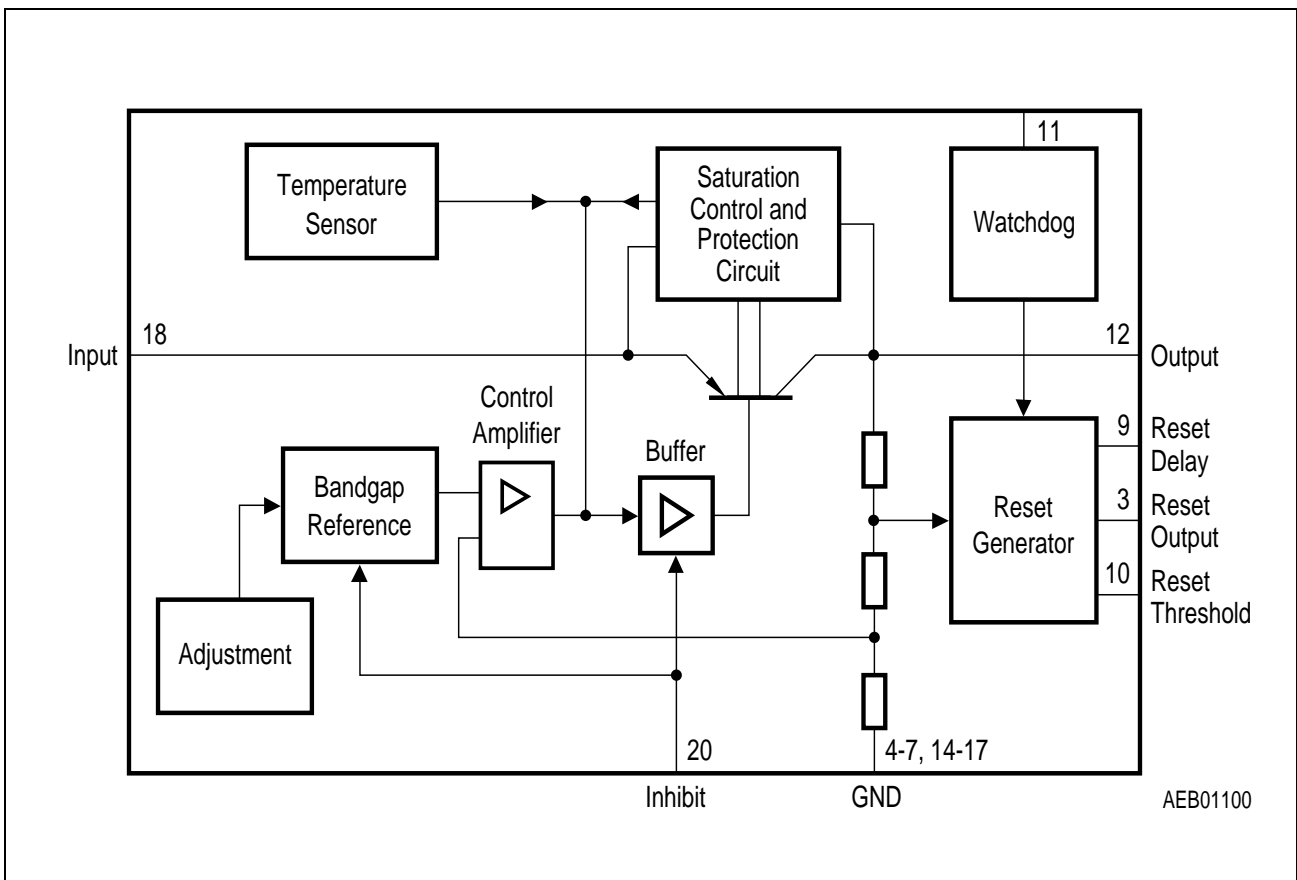
**Pin Definitions and Functions**

Pin	Symbol	Function
1, 2, 19, 13	N.C.	Not connected
3	QRES	<b>Reset output</b> ; open-collector output connected to the output via a resistor of 30 kΩ.
4-7, 14-17	GND	<b>Ground</b>
9	DRES	<b>Reset delay</b> ; connected to ground with a capacitor.
10	SRES	<b>Reset threshold</b> ; for setting the switching threshold connect with a voltage divider from output to ground. If this input is connected to GND, reset is triggered at an output voltage of 4.5 V.
11	W	<b>Watchdog</b> ; positive edge triggered input for monitoring a microcontroller.
12	$V_Q$	<b>5-V output voltage</b> ; block to ground with a 22-μF capacitor.
18	$V_I$	<b>Input voltage</b> ; block to ground directly at the IC with a ceramic capacitor.
20	INH	<b>Inhibit</b> ; TTL-compatible, low-active input.

**Circuit Description**

The control amplifier compares a reference voltage, which is kept highly accurate by resistance adjustment, to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer. Saturation control as a function of the load current prevents any over-saturation of the power element. If the externally scaled down output voltage at the reset threshold input drops below 1.35 V, the external reset delay capacitor is discharged by the reset generator. If the voltage on the capacitor reaches the lower threshold  $V_{ST}$ , a reset signal is issued on the reset output and not cancelled again until the upper threshold  $V_{dT}$  is exceeded. If the reset threshold input is connected to GND, reset is triggered at an output voltage of 4.5 V. A connected microcontroller is controlled by the watchdog logic. If pulses are missing, the reset output is set to low. The pulse sequence time can be set within a wide range with the reset delay capacitor. The IC can be switched at the TTL-compatible, low-active inhibit input. The IC also incorporates a number of internal circuits for protection against:

- Overload
- Overtemperature
- Reverse polarity



**Block Diagram**

## Absolute Maximum Ratings

$T_j = -40$  to  $150$  °C

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		

### Input

Input voltage	$V_I$	-42	45	V	-
Input current	$I_I$	-	-	-	internally limited

### Reset Output

Voltage	$V_R$	-0.3	42	V	-
Current	$I_R$	-	-	-	internally limited

### Reset Input

Reset threshold	$V_{RE}$	-0.3	6	V	-
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### Reset Delay

Voltage	$V_d$	-0.3	42	V	-
Current	$I_d$	-	-	-	internally limited

### Output

Voltage	$V_Q$	-0.3	7	V	-
Current	$I_Q$	-	-	-	internally limited

### Inhibit

Voltage	$V_e$	-42	45	V	-
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### Watchdog

Voltage	$V_W$	-0.3	6	V	-
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### Ground

Current	$I_{GND}$	-0.5	-	A	-
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**Absolute Maximum Ratings** (cont'd) $T_j = -40$  to  $150$  °C

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		

**Temperature**

Junction temperature	$T_j$	–	150	°C	–
Storage temperature	$T_{stg}$	– 50	150	°C	–

**Operating Range**

Input voltage	$V_I$	–	45	V	–
Junction temperature	$T_j$	– 40	150	°C	–
Thermal resistance junction-ambient	$R_{th JA}$	–	70	K/W	soldered
junction-case	$R_{th JC}$	–	25	K/W	–

## Characteristics

$V_i = 13.5 \text{ V}$ ;  $T_j = 25 \text{ }^\circ\text{C}$ ;  $V_e > 3.5 \text{ V}$ ; (unless specified otherwise)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

## Normal Operation

Output voltage	$V_Q$	4.90	5.00	5.10	V	$5 \text{ mA} \leq I_Q \leq 150 \text{ mA}$ ; $6 \text{ V} \leq V_i \leq 28 \text{ V}$ ; $-40 \text{ }^\circ\text{C} \leq T_j \leq 125 \text{ }^\circ\text{C}$
Output voltage	$V_Q$	4.95	5.00	5.05	V	$6 \text{ V} \leq V_i \leq 32 \text{ V}$ ; $I_Q = 100 \text{ mA}$ ; $T_j = 100 \text{ }^\circ\text{C}$
Output current	$I_Q$	200	250	–	mA	–
Current consumption; $I_q = I_i - I_Q$	$I_q$	–	–	50	$\mu\text{A}$	$V_e = 0$
	$I_q$	–	800	1100	$\mu\text{A}$	$I_Q = 0 \text{ mA}$
	$I_q$	–	10	15	mA	$I_Q = 150 \text{ mA}$
	$I_q$	–	15	20	mA	$I_Q = 150 \text{ mA}$ ; $V_i = 4.5 \text{ V}$
Drop voltage	$V_{Dr}$	–	0.35	0.6	V	$I_Q = 150 \text{ mA}^*)$
Load regulation	$\Delta V_Q$	–	–	25	mV	$I_Q = 5 \text{ mA to } 150 \text{ mA}$
Supply-voltage regulation	$\Delta V_Q$	–	15	25	mV	$V_i = 6 \text{ V to } 28 \text{ V}$ ; $I_Q = 150 \text{ mA}$
Ripple rejection	$SVR$	–	54	–	dB	$f_r = 100 \text{ Hz}$ ; $V_r = 0.5 \text{ Vpp}$

## Reset Generator

Switching threshold	$V_{RT}$	4.2	4.5	4.8	V	$V_{RE} = 0 \text{ V}$
Switching voltage	$V_{RE}$	1.28	1.35	1.42	V	$V_Q > 3.5 \text{ V}$
Reset low voltage	$V_R$	–	0.10	0.40	V	$I_R = 1 \text{ mA}$

**Note:** The reset output is low within the range  $V_Q = 1 \text{ V}$  to  $V_{RT}$

\*) Drop voltage =  $V_i - V_Q$  (measured when the output voltage has dropped 100 mV from the nominal value obtained at 13.5 V input)

**Characteristics** (cont'd)

$V_I = 13.5 \text{ V}$ ;  $T_j = 25 \text{ }^\circ\text{C}$ ;  $V_e > 3.5 \text{ V}$ ; (unless specified otherwise)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Saturation voltage	$V_C$	–	50	100	mV	$V_Q < V_{RT}$
Delay switching threshold	$V_{dT}$	1.5	1.7	2.1	V	–
Switching threshold	$V_{ST}$	0.2	0.35	0.55	V	–
Charge current	$I_d$	40	60	80	$\mu\text{A}$	–
Delay time	$t_d$	–	2.8	–	ms	$C_d = 100 \text{ nF}$
Delay time	$t_t$	–	2	–	$\mu\text{s}$	$C_d = 100 \text{ nF}$

**Watchdog**

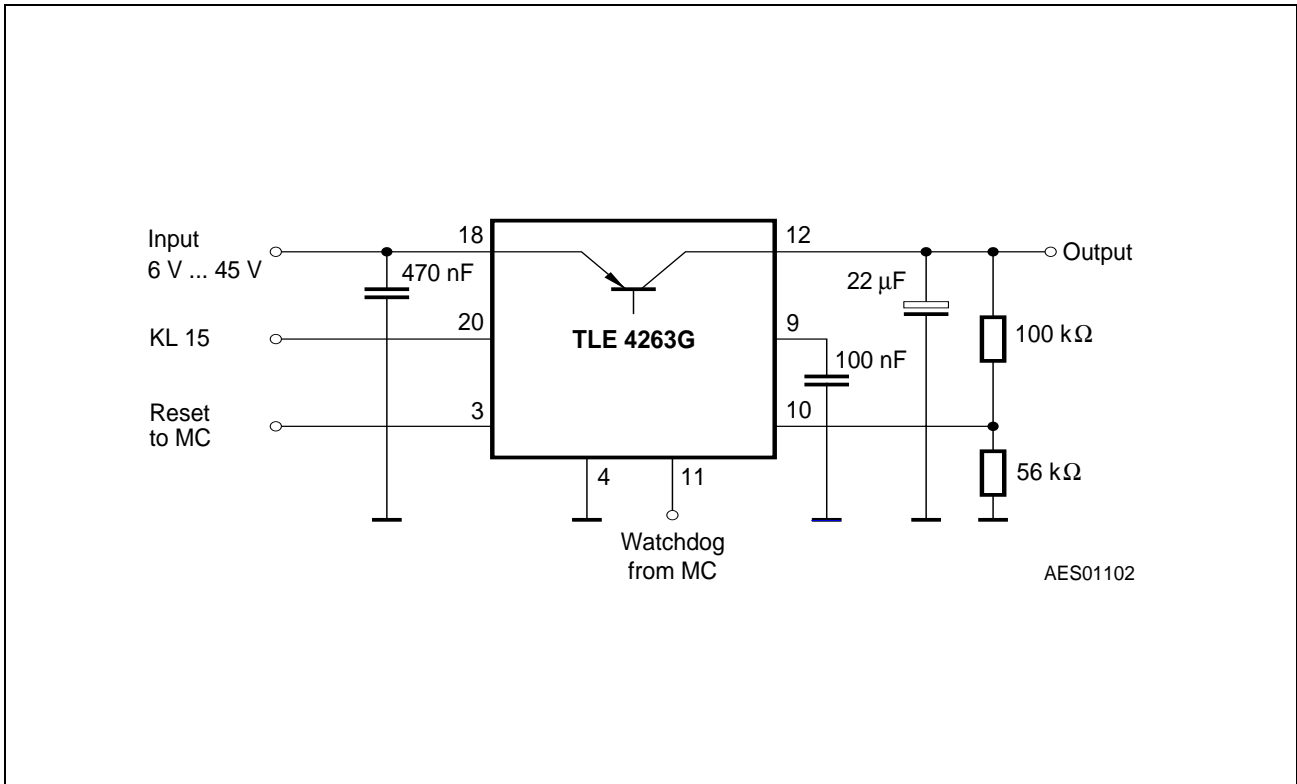
Discharge current	$I_{Cd}$	4.4	6.25	8.2	$\mu\text{A}$	$V_C = 1.5 \text{ V}$
Switching voltage	$V_{Cd}$	1.5	1.7	2.1	V	–
Pulse time	$T_W$	–	22.5	–	ms	$C_d = 100 \text{ nF}$

**Inhibit**

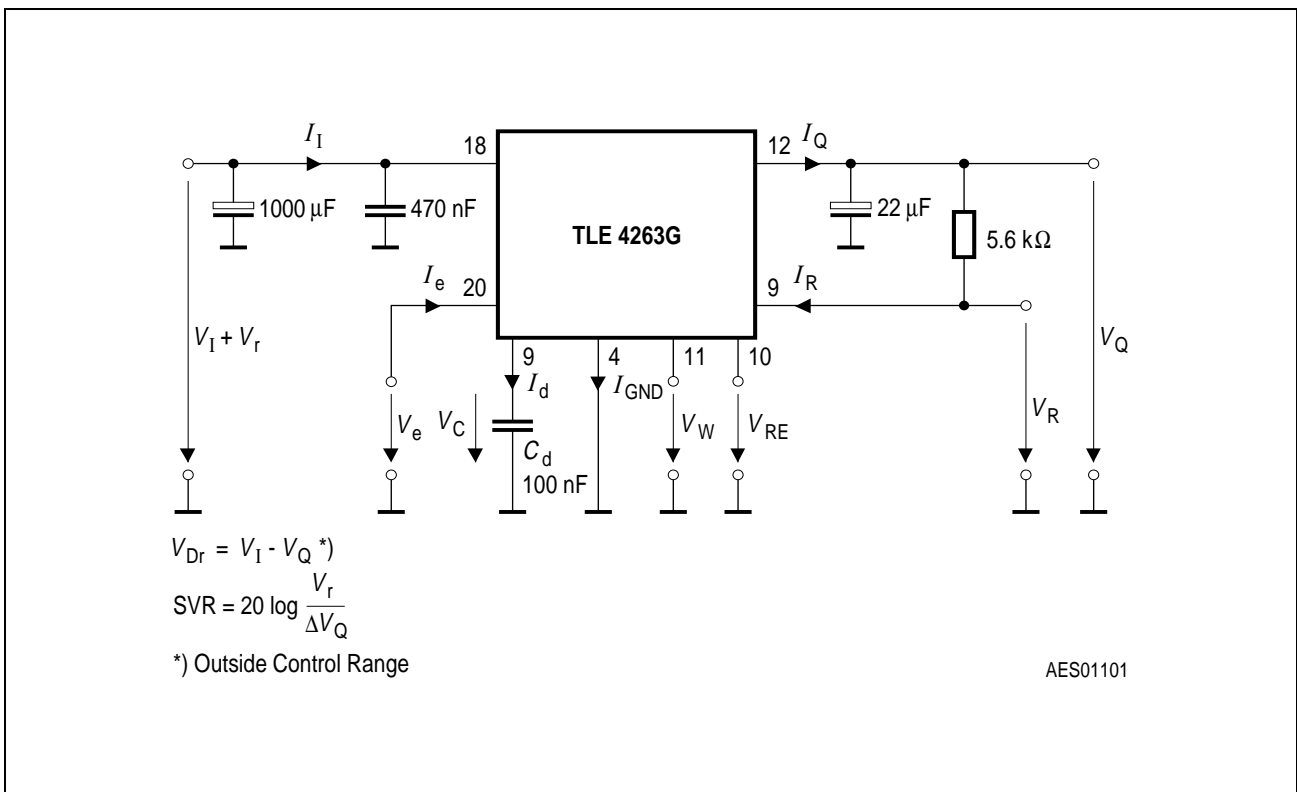
Switching voltage	$V_{eON}$	3.5	–	–	V	IC turned on
Turn-OFF voltage	$V_{eOFF}$	–	–	0.8	V	IC turned off
Input current	$I_e$	5	10	15	$\mu\text{A}$	$V_e = 5 \text{ V}$

**Note:** The reset output is low within the range  $V_Q = 1 \text{ V}$  to  $V_{RT}$

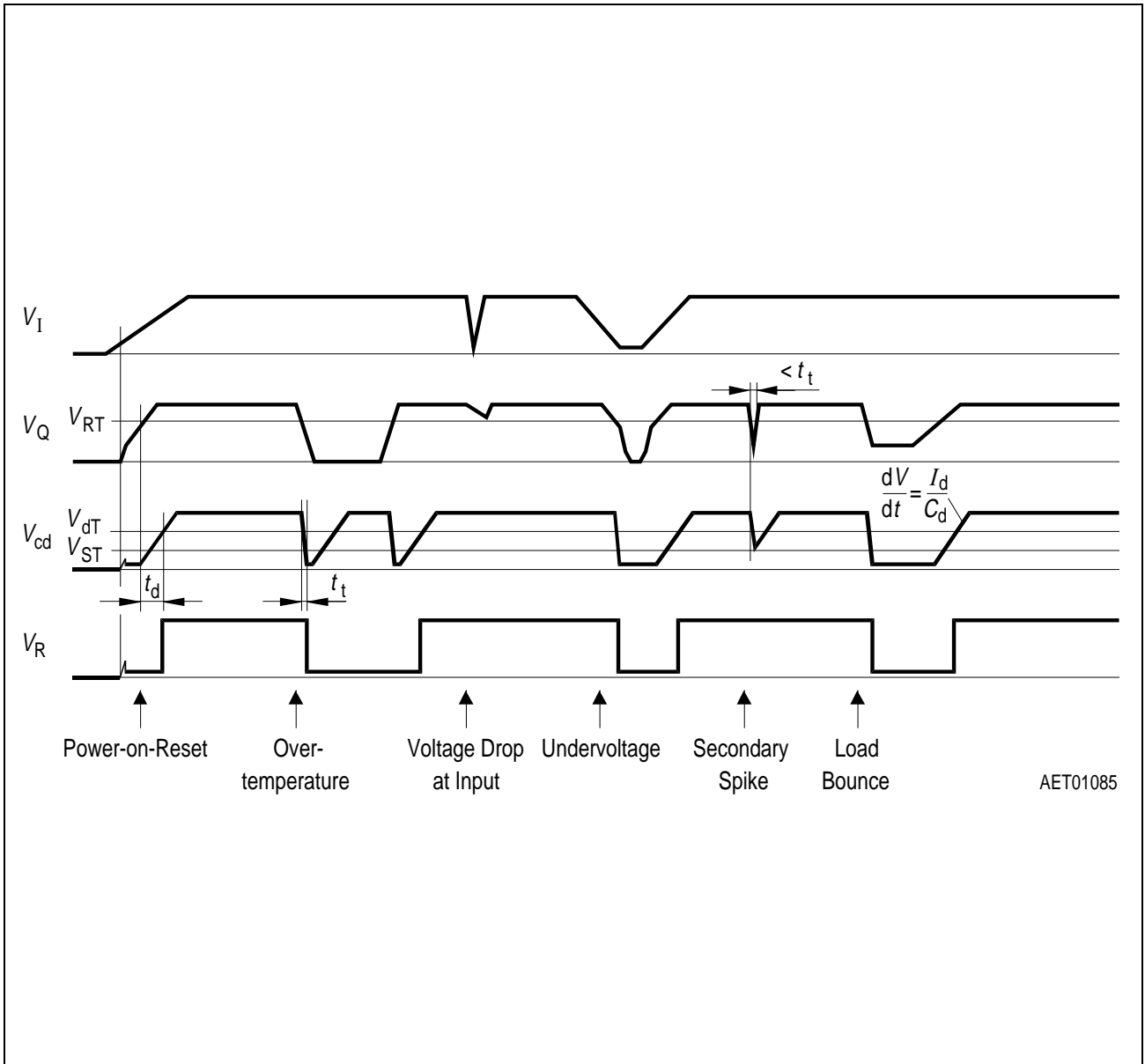




**Application Circuit**



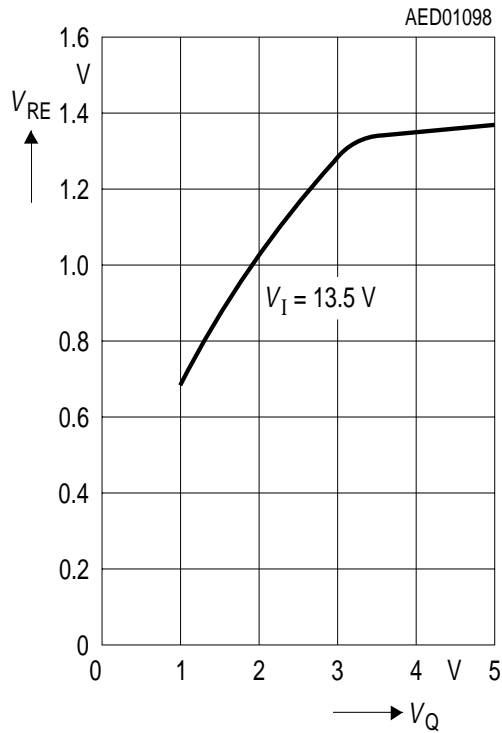
**Test Circuit**



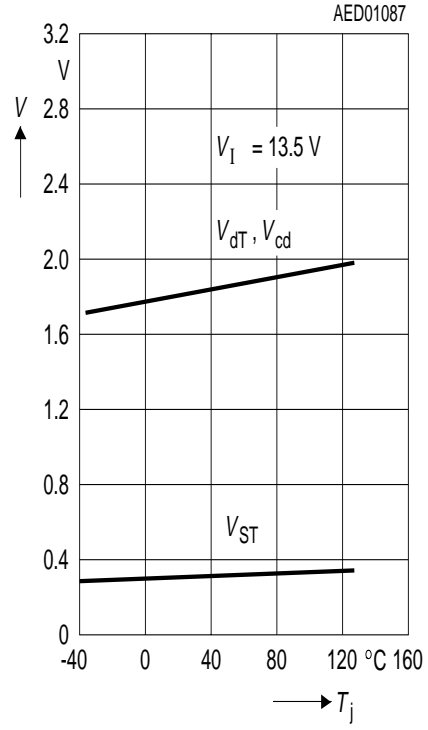
AET01085

**Time Response, Watchdog with High-Frequency Clock**

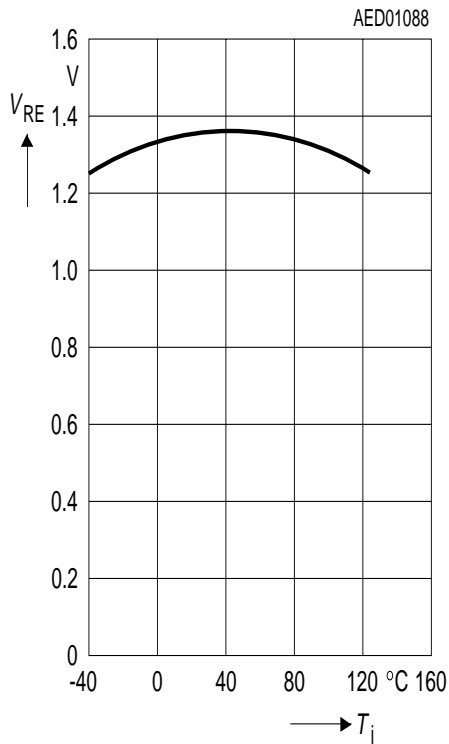
Reset Threshold versus Output Voltage



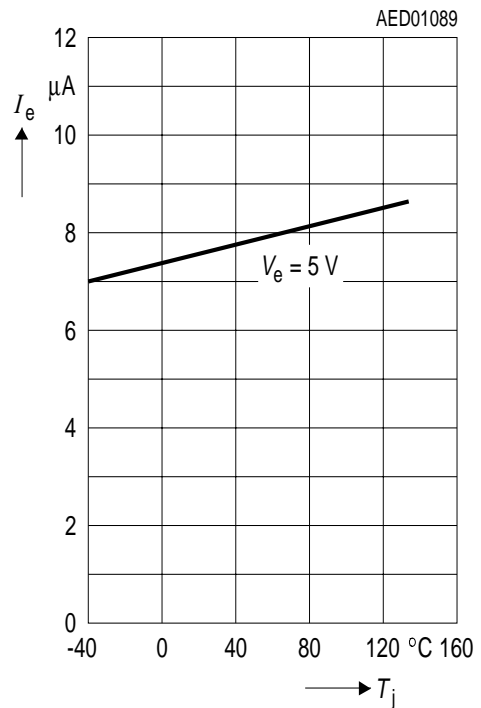
Switching Voltage  $V_{Cd}$ ,  $V_{dT}$  and  $V_{ST}$  versus Temperature



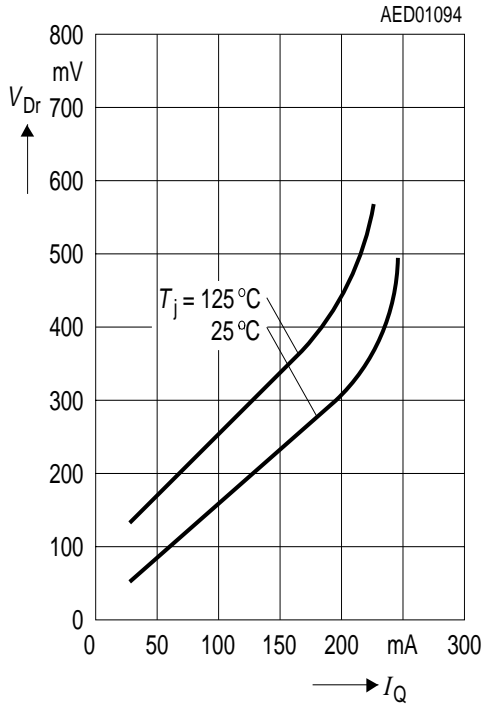
Reset Switching Threshold versus Temperature



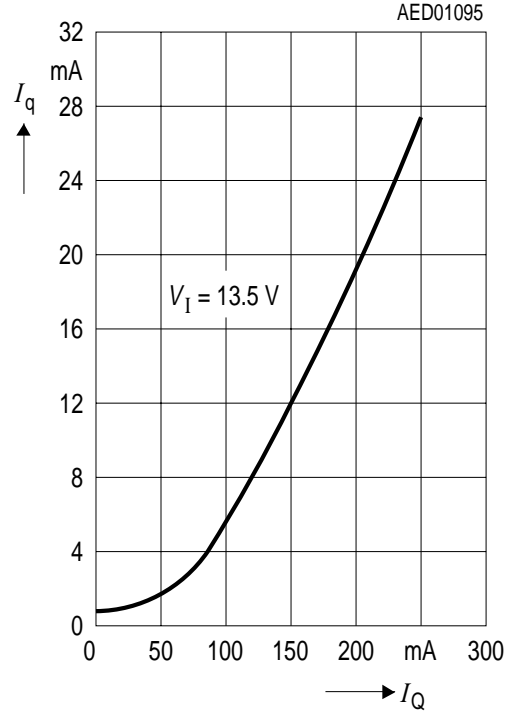
Current Consumption of Inhibit versus Temperature



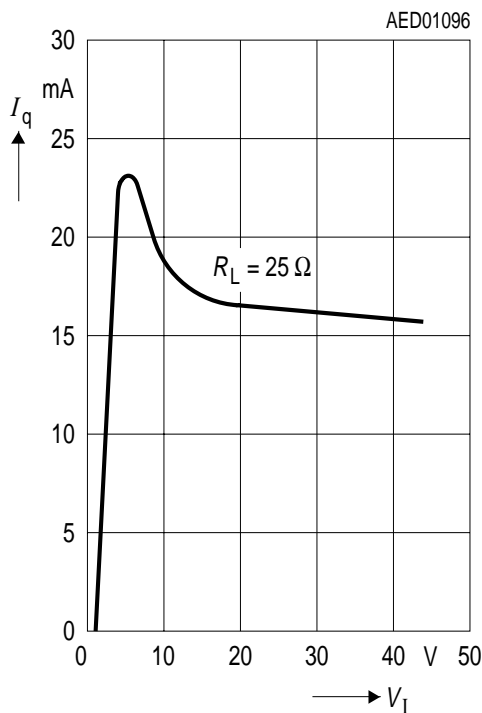
Drop Voltage versus Output Current



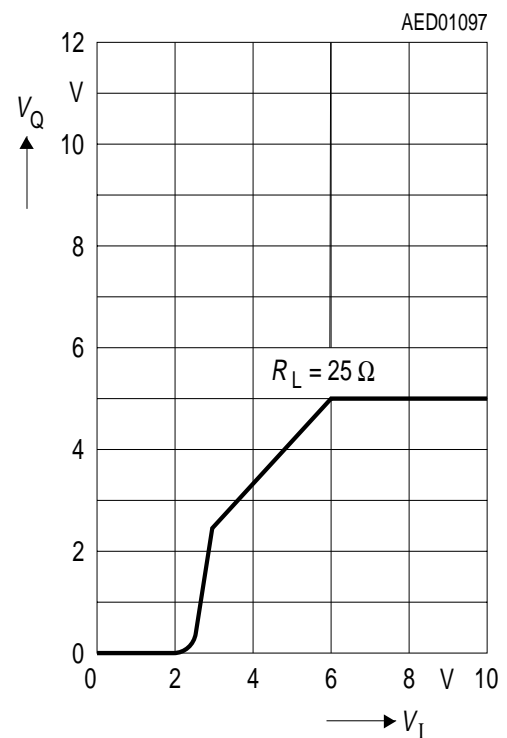
Current Consumption versus Output Current



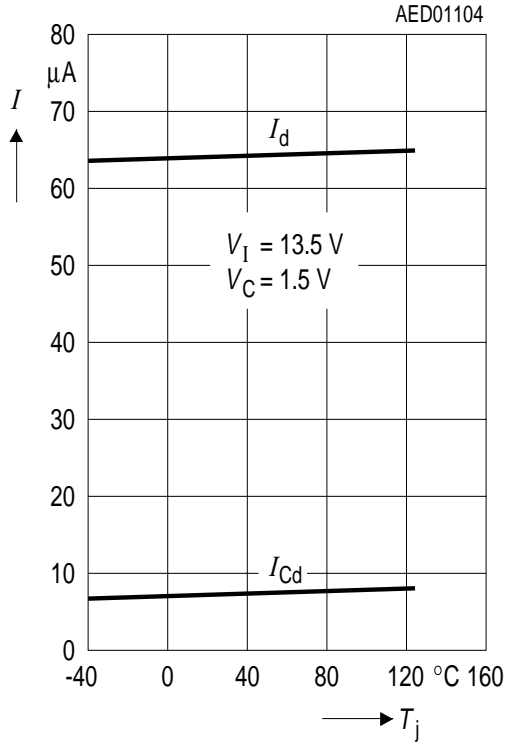
Current Consumption versus Input Voltage



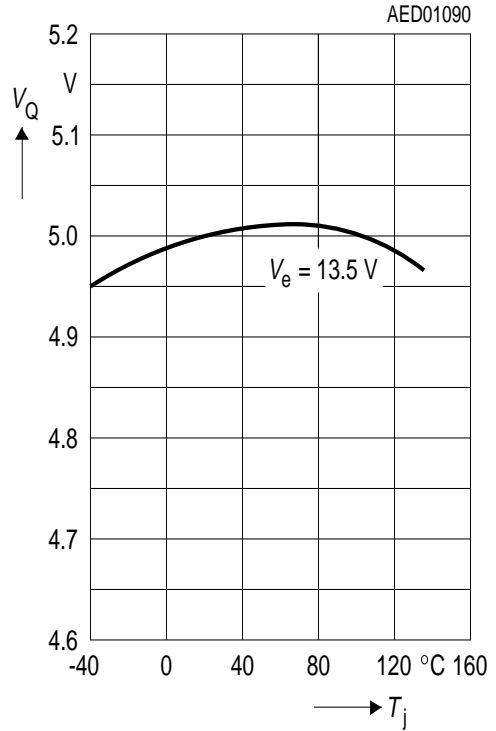
Output Voltage versus Input Voltage



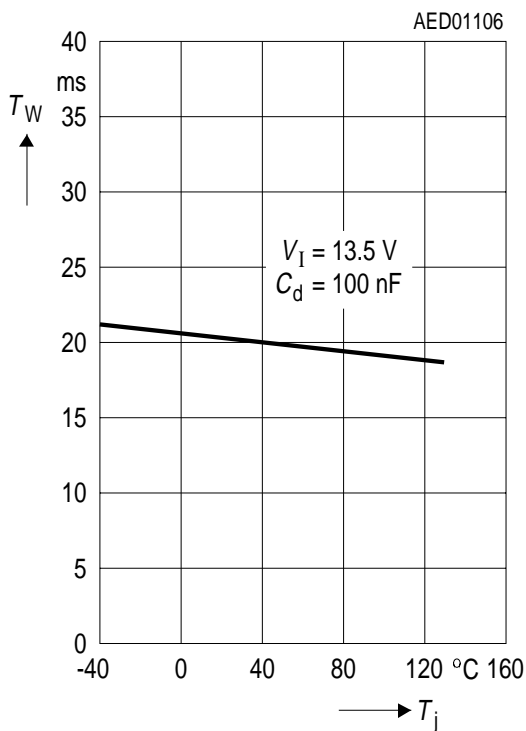
**Charge Current and Discharge Current versus Temperature**



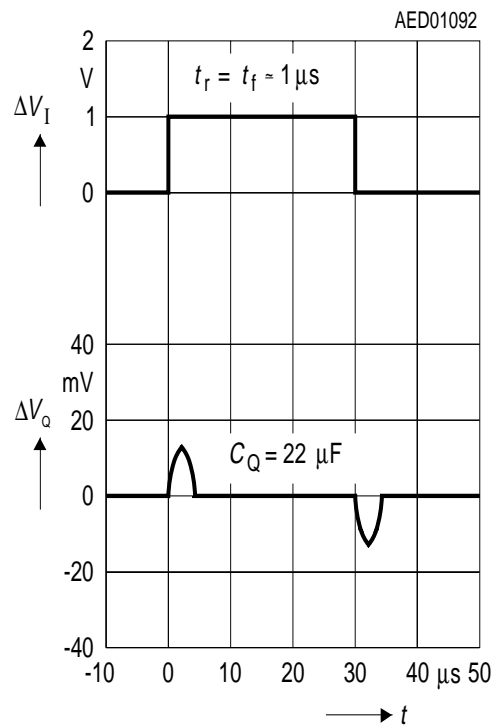
**Output Voltage versus Temperature**



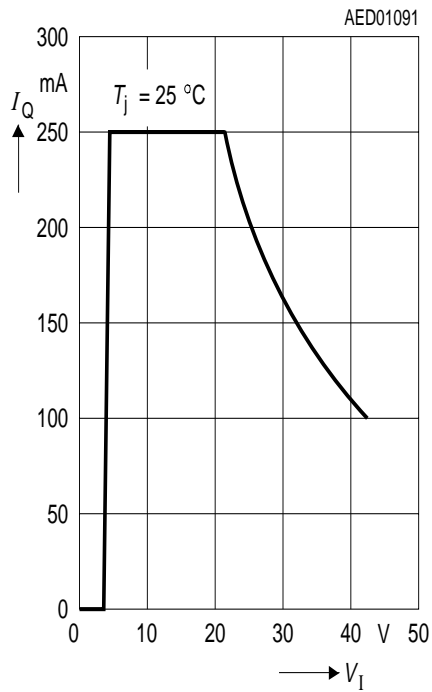
**Pulse Time versus Temperature**



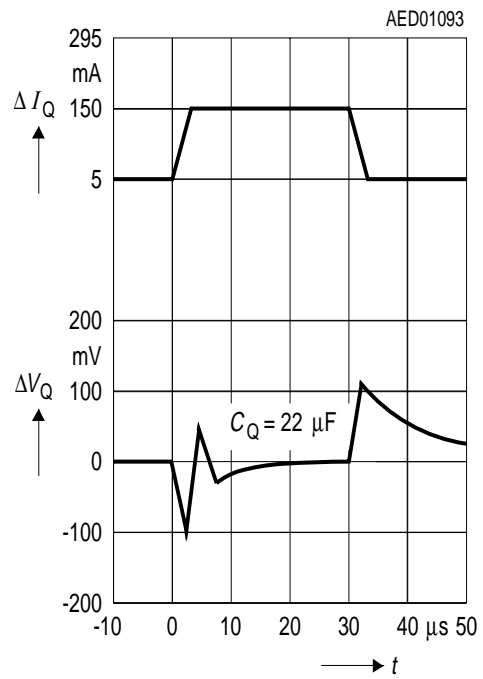
**Input Response**



## Output Current versus Input Voltage

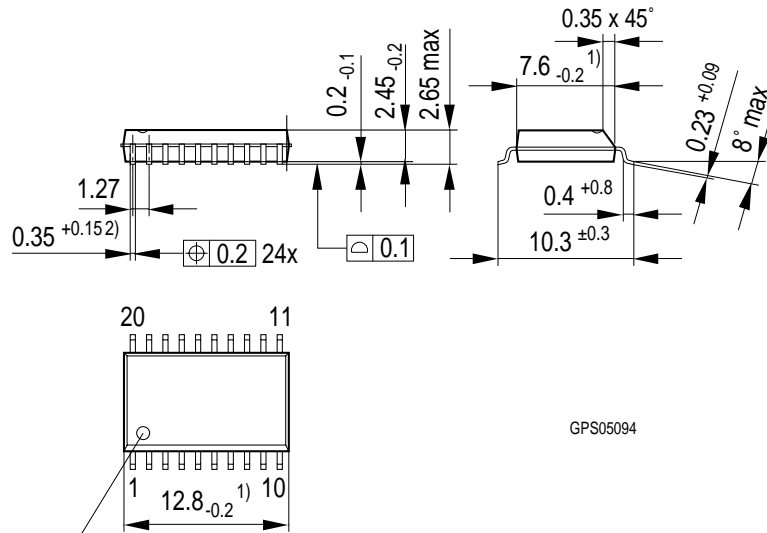


## Load Response



Package Outlines

**P-DSO-20-6**  
(Plastic Dual Small Outline)



GPS05094

Index Marking

- 1) Does not include plastic or metal protrusions of 0.15 max per side
- 2) Does not include dambar protrusion of 0.05 max per side

Weight approx. 0.6 g

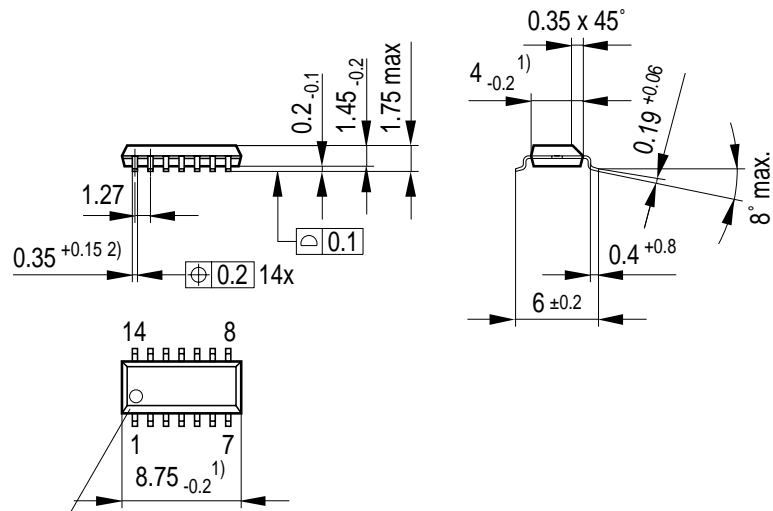
**Sorts of Packing**

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

SMD = Surface Mounted Device

Dimensions in mm

**P-DSO-14-1**  
(Plastic Dual Small Outline)



Index Marking

- 1) Does not include plastic or metal protrusion of 0.15 max. per side
- 2) Does not include dambar protrusion of 0.05 max. per side

GPS05093

**Sorts of Packing**

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

SMD = Surface Mounted Device

Dimensions in mm