

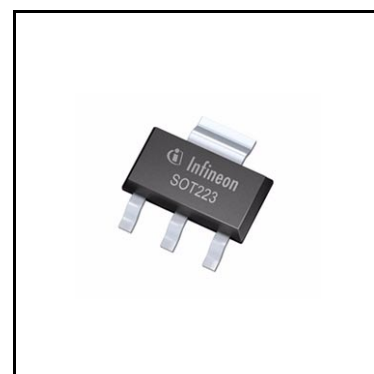
OPTIREG™ Linear TLE4266-2G

Low drop voltage regulator



Features

- Fixed output voltage 5.0 V or 3.3 V
- Output voltage tolerance $\leq \pm 2\%$, $\pm 3\%$
- 150 mA current capability
- Very low current consumption
- Low-drop voltage
- Overtemperature protection
- Reverse polarity proof
- Wide temperature range
- Suitable for use in automotive electronics
- Inhibit
- Green Product (RoHS compliant)



Potential applications

General automotive applications.

Product validation

Qualified for automotive applications. Product validation according to AEC-Q100/101.

Description

The OPTIREG™ Linear TLE4266-2G is a monolithic integrated low-drop fixed voltage regulator which can supply loads up to 150 mA. It can be switched on and off by the $\overline{\text{INH}}$ pin. It is functional compatible to the TLE4266, but with a reduced quiescent current of $\ll 1 \mu\text{A}$ in OFF mode and $40 \mu\text{A}$ in ON mode. The TLE4266-2G is especially designed for all applications that require very low quiescent current in ON and OFF mode. The device is available in the small surface mounted PG-SOT223-4 package. It is pin compatible to the TLE4266G. It is designed to supply microprocessor systems under the severe condition of automotive applications and therefore it is equipped with additional protection against over load, short circuit and overtemperature. Of course the TLE4266-2G can be used in other applications, where a stabilized voltage and the inhibit feature is required.

And input voltage V_1 up to 45 V is regulated to $V_O = 5 \text{ V}$ (TLE4266-2G) or $V_O = 3.3 \text{ V}$ (TLE4266-2GSV33) with an accuracy of $\pm 3\%$. For the 5 V device an accuracy of $\pm 2\%$ is kept for a load current range up to 50 mA.

The device operates in the temperature range of $T_j = -40$ to 150°C . A High level at the $\overline{\text{INH}}$ pin switches the regulator on.

OPTIREG™ Linear TLE4266-2G
Low drop voltage regulator



Type	Package	Marking
TLE4266-2G	PG-SOT223-4	4266-2
TLE4266-2GSV33	PG-SOT223-4	33 4266-2

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Block diagram

1 Block diagram

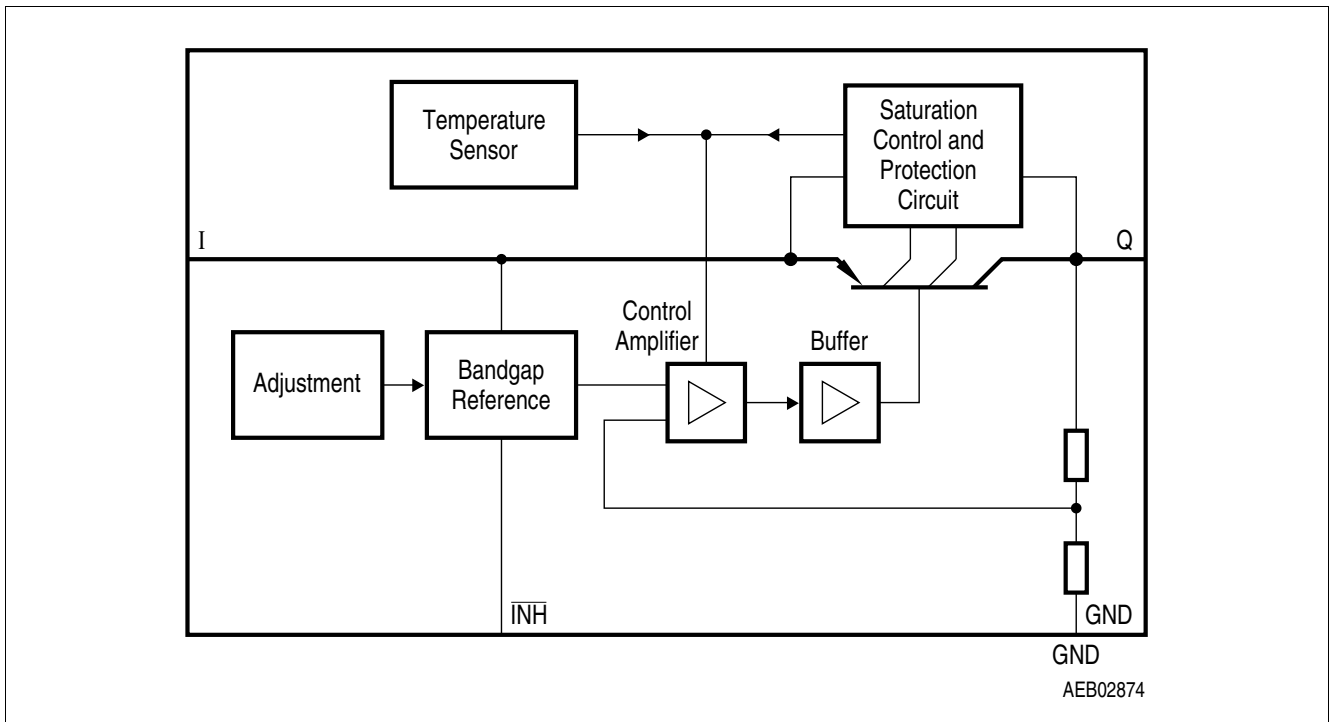


Figure 1 Block diagram

Pin configuration

2 Pin configuration

2.1 Pin assignment

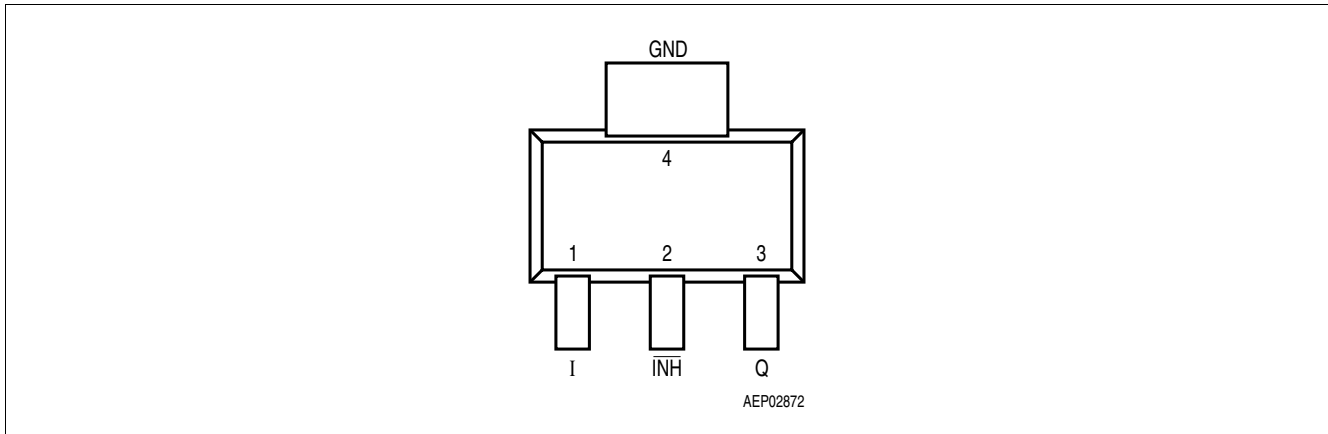


Figure 2 Pin configuration (top view)

2.2 Pin definitions and functions

Table 1 Pin definitions and functions TLE4266-2G, TLE4266-2GSV33

Pin	Symbol	Function
1	I	Input voltage Block to ground directly at the IC with a ceramic capacitor.
2	$\overline{\text{INH}}$	Inhibit input High level turns IC on, integrated pull-down resistor.
3	Q	Output voltage Block to ground with a capacitor $C_Q \geq 10 \mu\text{F}$, $\text{ESR} \leq 4 \Omega$.
4	GND	Ground

General product characteristics

3 General product characteristics

3.1 Absolute maximum ratings

Table 2 Absolute maximum ratings

$-40^{\circ}\text{C} \leq T_j \leq 150^{\circ}\text{C}$

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Input I						
Voltage	V_I	-42	-	45	V	-
Current	I_I	-	-	-	-	Internally limited
Inhibit $\overline{\text{INH}}$						
Voltage	$V_{\overline{\text{INH}}}$	-42	-	45	V	-
Output Q						
Voltage	V_Q	-0.3	-	32	V	-
Current	I_Q	-	-	-	-	Internally limited
GND						
Current	I_{GND}	50	-	-	mA	-
Temperature						
Junction temperature	T_j	-	-	150	$^{\circ}\text{C}$	-
Storage temperature	T_S	-50	-	150	$^{\circ}\text{C}$	-
Thermal resistance						
Junction ambient	$R_{\text{thj-a}}$	-	-	81	K/W	PG-SOT223-4 ¹⁾
Junction case	$R_{\text{thj-pin4}}$	-	-	18	K/W	PG-SOT223-4
Operating range						
Input voltage	V_I	5.5	-	45	V	TLE4266-2G
		4.4	-	45	V	TLE4266-2GSV33
Junction temperature	T_j	-40	-	150	$^{\circ}\text{C}$	-

1) Worst case, regarding peak temperature; zero airflow; mounted on a PCB $80 \times 80 \times 1.5 \text{ mm}^3$, heat sink area 300 mm^2 .

Functional description

4 Functional description

In the TLE4266-2G the output voltage is divided and compared to an internal reference of 2.5 V typical. The regulation loop controls the output to achieve an output voltage of 5 V with an accuracy of $\pm 2\%$ at an input voltage up to 45 V. The minimum required input voltage is $V_Q + V_{Dr}$ with a drop voltage V_{Dr} of max. 0.5 V (see [Chapter 4.3](#)) in case of the TLE4266-2G. The TLE4266-2GSV33 requires a minimum input voltage of 4.4 V.

The TLE4266-2G can supply up to 150 mA. However for protection reasons at high input voltage above 25 V, the maximum output current is reduced (SOA protection).

Figure 3 shows a typical measuring circuit. For stability of the control loop the TLE4266-2G output requires an output capacitor C_Q of at least 10 μF with a maximum permissible ESR of 4 Ω . Tantalum as well as multi layer ceramic capacitors are suitable.

At the input of the regulator an input capacitor is necessary for compensating line influences (100 nF ceramic capacitor recommended). A resistor of approx. 1 Ω in series with C_I , can damp any oscillation occurring due the input inductivity and the input capacitor. In the measuring circuit shown in **Figure 3** an additional electrolytic input capacitor of 470 μF is added in order to buffer supply line influences. This capacitor is recommended, if the device is sourced via long supply lines of several meters.

The TLE4266-2G includes the Inhibit function. For a voltage above 3.5 V at the $\overline{\text{INH}}$ pin the regulator is switched on.

4.1 Electrical characteristics

Table 3 Electrical characteristics

$V_I = 13.5\text{ V}$; $V_{\overline{\text{INH}}} = 5\text{ V}$; $-40^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Output voltage	V_Q	4.85	5.0	5.15	V	TLE4266-2G; 5 mA $\leq I_Q \leq$ 100 mA; 6 V $\leq V_I \leq$ 21 V
		4.9	5.0	5.1	V	TLE4266-2G; 5 mA $\leq I_Q \leq$ 50 mA; 9 V $\leq V_I \leq$ 16 V
Output voltage	V_Q	3.20	3.30	3,40	V	TLE4266-2GSV33; 5 mA $\leq I_Q \leq$ 100 mA; 6 V $\leq V_I \leq$ 21 V
Output-current limitation	I_Q	150	200	500	mA	–
Current consumption $I_q = I_I - I_Q$	I_q	–	0	1	μA	$V_{\overline{\text{INH}}} = 0\text{ V}$; $T_j \leq 100^\circ\text{C}$
Current consumption $I_q = I_I - I_Q$	I_q	–	40	60	μA	$I_Q = 100\ \mu\text{A}$; $T_j \leq 85^\circ\text{C}$
		–	40	70	μA	$I_Q = 100\ \mu\text{A}$
Current consumption $I_q = I_I - I_Q$	I_q	–	1.7	4	mA	$I_Q = 50\text{ mA}$
Drop voltage	V_{Dr}	–	0.25	0.5	V	TLE4266-2G; $I_Q = 100\text{ mA}^{1)}$
Drop voltage	V_{Dr}	–	1.00	1.10	V	TLE4266-2GSV33; $I_Q = 100\text{ mA}^{1)}$

Functional description

Table 3 Electrical characteristics (cont'd)

$V_I = 13.5\text{ V}$; $V_{INH} = 5\text{ V}$; $-40^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Load regulation	ΔV_Q	–	50	90	mV	TLE4266-2G; $I_Q = 1$ to 100 mA ; $V_I = 6\text{ V}$
Load regulation	ΔV_Q	–	35	60	mV	TLE4266-2GSV33; $I_Q = 1$ to 100 mA ; $V_I = 6\text{ V}$
Line regulation	ΔV_Q	–	5	30	mV	TLE4266-2G; $V_I = 6\text{ V}$ to 28 V ; $I_Q = 1\text{ mA}$
Line regulation	ΔV_Q	–	4	20	mV	TLE4266-2GSV33; $V_I = 6\text{ V}$ to 28 V ; $I_Q = 1\text{ mA}$
Power supply ripple rejection	$PSRR$	–	68	–	dB	$f_r = 100\text{ Hz}$; $V_r = 0.5\text{ Vpp}$
Output Capacitor	C_Q	10	–	–	μF	$ESR \leq 4\ \Omega$ at 10 kHz

Inhibit

Inhibit on voltage	$V_{INH, on}$	3.5	–	–	V	–
Inhibit off voltage	$V_{INH, off}$	–	–	0.8	V	–
Inhibit current	I_{INH}	–	4	8	μA	$V_{INH} = 5\text{ V}$
Pull-down resistor	R_{INH}	–	1.0	–	$\text{M}\Omega$	see I_{INH}

1) Drop voltage $V_{Dr} = V_I - V_Q$ (measured when the output voltage V_Q has dropped 100 mV from the nominal value obtained at $V_I = 13.5\text{ V}$).

Functional description

4.2 Circuit description

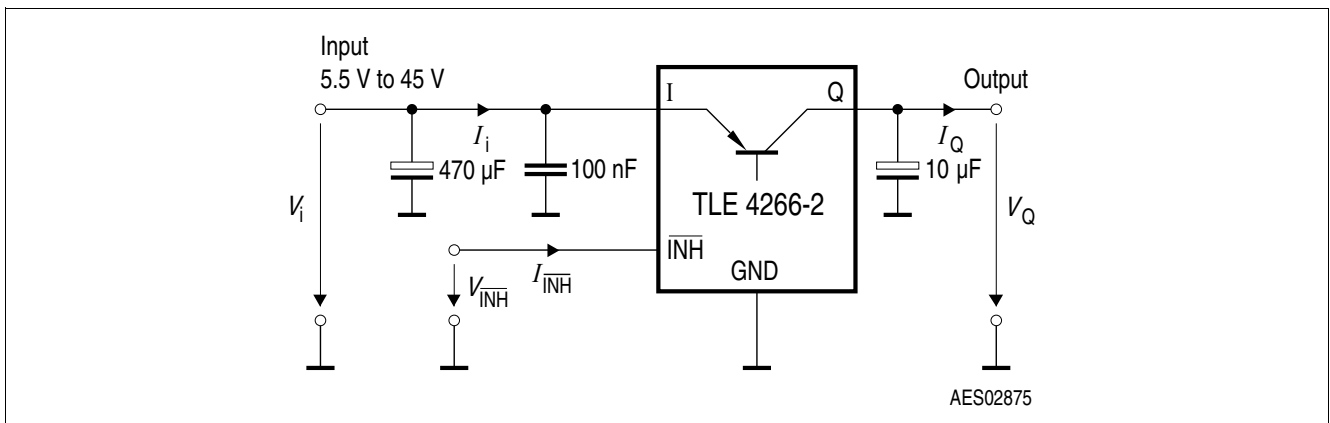
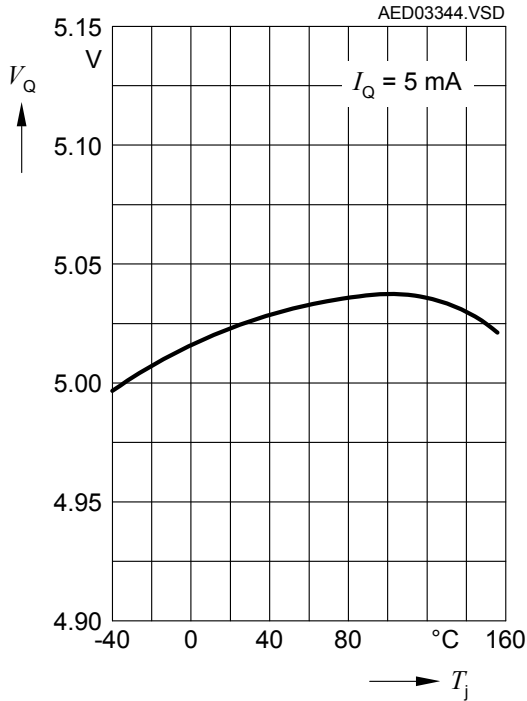


Figure 3 Measuring circuit

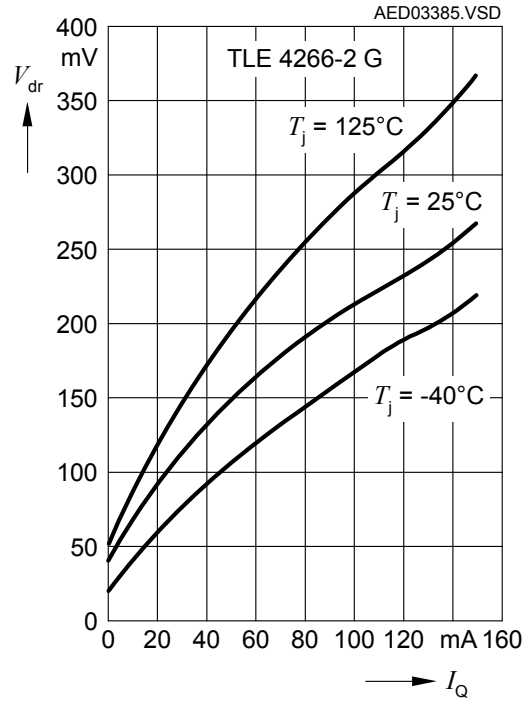
Functional description

4.3 Typical performance characteristics

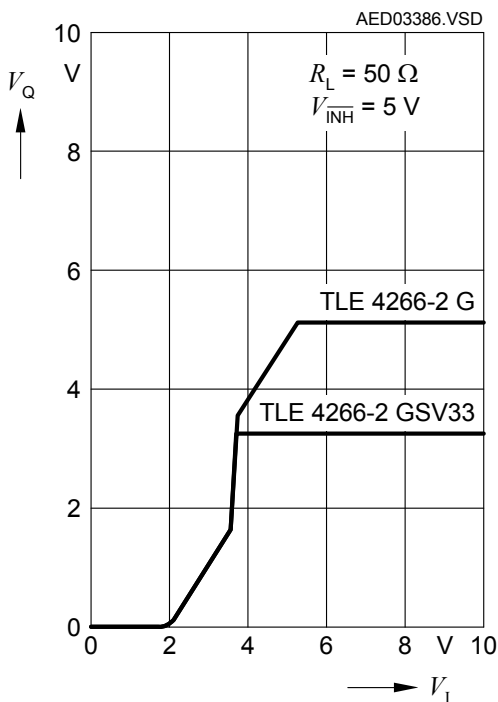
Output voltage V_Q versus junction temperature T_j



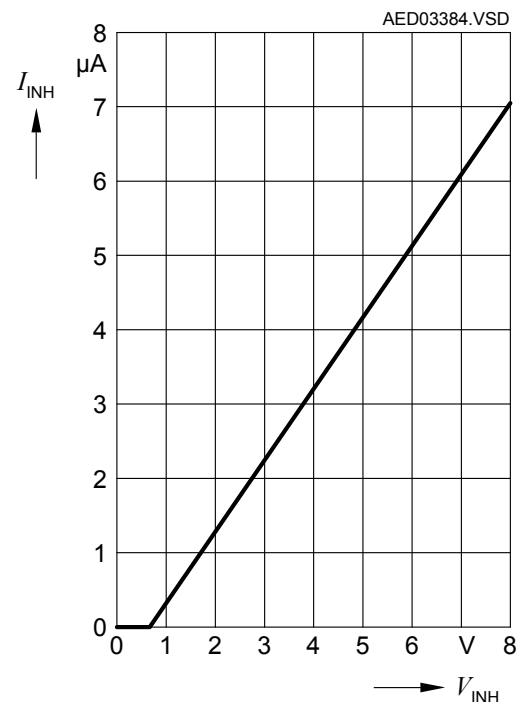
Drop voltage V_{Dr} versus output current I_Q (TLE4266-2G)



Output voltage V_Q versus input voltage V_I

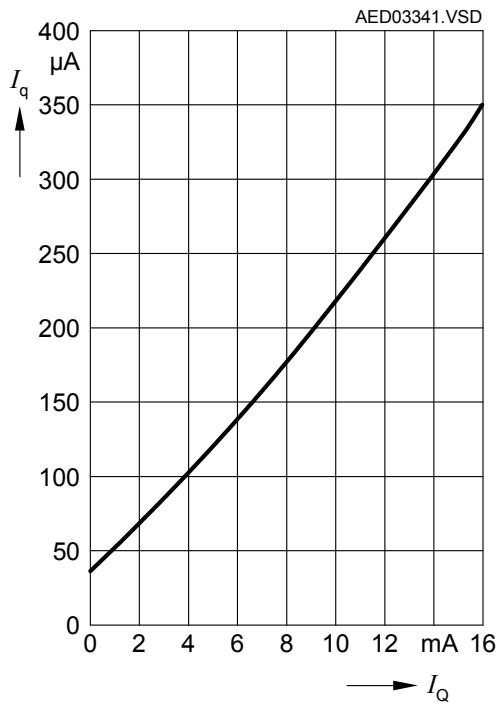


Inhibit current I_{INH} versus inhibit voltage V_{INH}

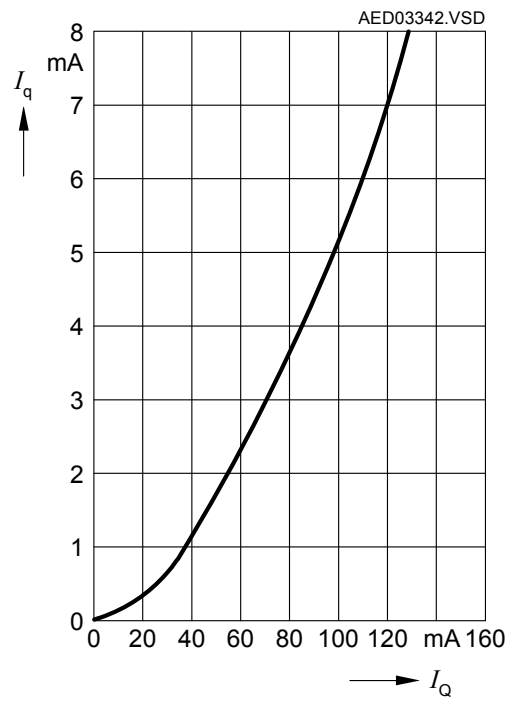


Functional description

Current consumption I_q versus output current I_Q



Current consumption I_q versus output current I_Q



Revision history

6 Revision history

Revision	Date	Changes
1.51	2019-06-03	Editorial change, added marking
1.5	2019-02-15	Updated layout and structure. Editorial changes.
1.4	2008-03-10	Simplified package name to PG-SOT223-4. No modification of released product.
1.3	2007-03-20	Initial version of RoHS-compliant derivate of TLE4266-2G. Page 1: AEC certified statement added. Page 1: and Page 10: RoHS compliance statement and Green product feature added. Page 1: and Page 10: Package changed to RoHS compliant version. Legal Disclaimer updated.

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